OMB Number: 4040-0004
Expiration Date: 04/31/2012

Application for Federal Assistance SF-424

Version 02

*1. Type of Submission	*2. Type of Application	*If Revision, select appropriate letter(s):
☐ Preapplication	☑ New	
☑ Application	☐ Continuation	* Other (Specify)
☐ Changed/Corrected Application	☐ Revision	

*3. Date Received: 4. Application Identifier:

5a. Federal Entity Identifier:	*5b. Federal Award Identifier:
11-031	EPA-R9-WTR3-10-006

State Use Only:

6. Date Received by State:	7. State Application Identifier:

8. APPLICANT INFORMATION:

* a. Legal Name: California State Coastal Conservancy

* b. Employer/Taxpayer Identification Number (EIN/TIN):	*c. Organizational DUNS:
94-3164968	8083224080000

d. Address:

*Street1: 1330 Broadway, 13th Floor
Street 2:
*City: Oakland
County:
*State: CA
Province:
Country: USA *Zip/ Postal Code: 94612-2530

e. Organizational Unit:

Department Name:	Division Name:

f. Name and contact information of person to be contacted on matters involving this application:

Prefix: First Name: Jeffrey
Middle Name:
*Last Name: Melby
Suffix:

Title: Project Manager

Organizational Affiliation:

*Telephone Number: 510-286-4088 Fax Number: 510-286-0470

*Email: jmelby@scc.ca.gov

OMB Number: 4040-0004
Expiration Date: 04/31/2012

Application for Federal Assistance SF-424

Version 02

9. Type of Applicant 1: Select Applicant Type: A. State Government

Type of Applicant 2: Select Applicant Type:

- Select One -

Type of Applicant 3: Select Applicant Type:

- Select One -

*Other (specify):

*10. Name of Federal Agency:
Environmental Protection Agency

11. Catalog of Federal Domestic Assistance Number:

66.126

CFDA Title:

The San Francisco Bay Water Quality Improvement Fund

*12. Funding Opportunity Number: EPA-R9-WTR3-10-006

*Title: San Francisco Bay Water Quality Improvement Fund

13. Competition Identification Number:

Title:

14. Areas Affected by Project (Cities, Counties, States, etc.):

*15. Descriptive Title of Applicant's Project:

Emerson Parcel Portion of the Dutch Slough Tidal Marsh Restoration Project

Attach supporting documents as specified in agency instructions.

OMB Number: 4040-0004
Expiration Date: 04/31/2012

Application for Federal Assistance SF-424

Version 02

16. Congressional Districts Of:

*a. Applicant 9 *b. Program/Project: 10

Attach an additional list of Program/Project Congressional Districts if needed.

17. Proposed Project:

*a. Start Date: 09/01/2011 *b. End Date: 04/30/2015

18. Estimated Funding ($):

*a. Federal	$1,400,000.00	*d. Local	
*b. Applicant	$2,754,200.00	*e. Other	
*c. State		*f. Program Income	
*d. Local		*g. TOTAL	$4,154,200.00

***19. Is Application Subject to Review By State Under Executive Order 12372 Process?**

☐ a. This application was made available to the State under the Executive Order 12372 Process for review on
☐ b. Program is subject to E.O. 12372 but has not been selected by the State for review.
☑ c. Program is not covered by E.O. 12372

*20. Is the Applicant Delinquent On Any Federal Debt? (If "Yes", provide explanation.)
☐ Yes ☑ No

21. *By signing this application, I certify (1) to the statements contained in the list of certifications** and (2) that the statements herein are true, complete and accurate to the best of my knowledge. I also provide the required assurances** and agree to comply with any resulting terms if I accept an award. I am aware that any false, fictitious, or fraudulent statements or claims may subject me to criminal, civil, or administrative penalties. (U.S. Code, Title 218, Section 1001)

☑ **I AGREE

** The list of certifications and assurances, or an internet site where you may obtain this list, is contained in the announcement or agency specific instructions.

Authorized Representative:

Prefix: *First Name: Samuel

Midd le N ame:

*Last Name: Schuchat

Suffix:

*Title: Executive Officer

*Telephone Number: 510-286-1015 Fax Number: 510-286-0470

*Email: sschuchat.ca.gov

*Signature of Authorized Representative: Date Signed: 6-3-11

BUDGET INFORMATION - Non-Construction Programs

OMB Approval No. 0348-0044

SECTION A - BUDGET SUMMARY

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. SF Bay Water QIF	66.126	$	$	$ 1,400,000.00	$ 2,754,200.00	$ 4,154,200.00
2.						0.00
3.						0.00
4.						0.00
5. Totals		$ 0.00	$ 0.00	$ 1,400,000.00	$ 2,754,200.00	$ 4,154,200.00

SECTION B - BUDGET CATEGORIES

6. Object Class Categories	GRANT PROGRAM, FUNCTION OR ACTIVITY				Total
	(1) Federal	(2) Match	(3)		(5)
a. Personnel	$ 55,080.00	$	$	$	$ 55,080.00
b. Fringe Benefits	19,828.00				19,828.00
c. Travel					0.00
d. Equipment					0.00
e. Supplies					0.00
f. Contractual					0.00
g. Construction	1,280,000.00	2,754,200.00			4,034,200.00
h. Other					0.00
i. Total Direct Charges *(sum of 6a-6h)*	1,354,908.00	2,754,200.00	0.00	0.00	4,109,108.00
j. Indirect Charges	45,092.00				45,092.00
k. TOTALS *(sum of 6i and 6j)*	$ 1,400,000.00	$ 2,754,200.00	$ 0.00	$ 0.00	$ 4,154,200.00
7. Program Income	$ 0.00	$ 0.00	$	$	$ 0.00

Authorized for Local Reproduction

Standard Form 424A (Rev. 7-97)
Prescribed by OMB Circular A-102

Previous Edition Usable

SECTION C - NON-FEDERAL RESOURCES				
(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) TOTALS
8. SF Bay Water Quality Improvement Fund	$ 2,754,200.00	$	$	$ 2,754,200.00
9.				0.00
10.				0.00
11.				0.00
12. TOTAL *(sum of lines 8-11)*	$ 2,754,200.00	$ 0.00	$ 0.00	$ 2,754,200.00

SECTION D - FORECASTED CASH NEEDS					
	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
13. Federal	$ 24,000.00	$ 6,000.00	$ 6,000.00	$ 6,000.00	$ 6,000.00
14. Non-Federal	193,400.00	48,350.00	48,350.00	48,350.00	48,350.00
15. TOTAL *(sum of lines 13 and 14)*	$ 217,400.00	$ 54,350.00	$ 54,350.00	$ 54,350.00	$ 54,350.00

SECTION E - BUDGET ESTIMATES OF FEDERAL FUNDS NEEDED FOR BALANCE OF THE PROJECT				
(a) Grant Program	FUTURE FUNDING PERIODS (Years)			
	(b) First	(c) Second	(d) Third	(e) Fourth
16. SF Bay Water Quality Improvement Fund	$ 24,000.00	$ 528,300.00	$ 804,300.00	$ 119,400.00
17.				
18.				
19.				
20. TOTAL *(sum of lines 16-19)*	$ 24,000.00	$ 528,300.00	$ 804,300.00	$ 119,400.00

SECTION F - OTHER BUDGET INFORMATION	
21. Direct Charges:	22. Indirect Charges: Approved indirect rate of 60.71%
23. Remarks:	

OMB Approval No. 0348-0040

ASSURANCES - NON-CONSTRUCTION PROGRAMS

Public reporting burden for this collection of information is estimated to average 15 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Management and Budget, Paperwork Reduction Project (0348-0040), Washington, DC 20503.

PLEASE DO NOT RETURN YOUR COMPLETED FORM TO THE OFFICE OF MANAGEMENT AND BUDGET. SEND IT TO THE ADDRESS PROVIDED BY THE SPONSORING AGENCY.

NOTE: Certain of these assurances may not be applicable to your project or program. If you have questions, please contact the awarding agency. Further, certain Federal awarding agencies may require applicants to certify to additional assurances. If such is the case, you will be notified.

As the duly authorized representative of the applicant, I certify that the applicant:

1. Has the legal authority to apply for Federal assistance and the institutional, managerial and financial capability (including funds sufficient to pay the non-Federal share of project cost) to ensure proper planning, management and completion of the project described in this application.

2. Will give the awarding agency, the Comptroller General of the United States and, if appropriate, the State, through any authorized representative, access to and the right to examine all records, books, papers, or documents related to the award; and will establish a proper accounting system in accordance with generally accepted accounting standards or agency directives.

3. Will establish safeguards to prohibit employees from using their positions for a purpose that constitutes or presents the appearance of personal or organizational conflict of interest, or personal gain.

4. Will establish safeguards to prohibit employees from using their positions for a purpose that constitutes or presents the appearance of personal or organizational conflict of interest, or personal gain.

5. Will comply with the Intergovernmental Personnel Act of 1970 (42 U.S.C. 4728-4763) relating to prescribed standards for merit systems for programs funded under one of the 19 statutes or regulations specified in Appendix A of OPM's Standards for a Merit System of Personnel Administration (5 C.F.R. 900, Subpart F).

6. Will comply with all Federal statutes relating to nondiscrimination. These include but are not limited to: (a) Title VI of the Civil Rights Act of 1964 (P.L. 88-352) which prohibits discrimination on the basis of race, color or national origin; (b) Title IX of the Education Amendments of 1972, as amended (20 U.S.C. 1681-1683, and 1685-1686), which prohibits discrimination on the basis of sex; (c) Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794), which prohibits discrimination on the basis of handicaps; (d) the Age Discrimination Act of 1975, as amended (42 U.S.C. 6101-6107), which prohibits discrimination of the basis of age; (e) the Drug Abuse Office and Treatment Act of 1972 (P.L. 92-255), as amended, relating to nondiscrimination on the basis of drug abuse; (f) the Comprehensive Alcohol Abuse and Alcoholism Prevention, Treatment and Rehabilitation Act of 1970 (P.L. 91-616), as amended, relating to nondiscrimination on the basis of alcohol abuse or alcoholism; (g) 523 and 527 of the Public Health Service Act of 1912 (42 U.S.C. 290 dd-3 and 290 ee-3), as amended, relating to confidentiality of alcohol and drug abuse patient records; (h) Title VII of the Civil Rights Act of 1968 (42 U.S.C. 3601 et seq.), as amended, relating to nondiscrimination in the sale, rental or financing of housing; (i) any other nondiscrimination provisions in the specific statute(s) under which application for Federal assistance is being made; and (j) the requirements of any other nondiscrimination statute(s) which may apply to the application.

7. Will comply, or has already complied, with the requirements of Titles II and III of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (P.L. 91-646) which provide for fair and equitable treatment of persons displaced or whose property is acquired as a result of Federal or federally-assisted programs. These requirements apply to all interests in real property acquired for project purposes regardless of Federal participation in purchases.

8. Will comply, as applicable, with provisions of the Hatch Act (5 U.S.C. 1501-1508 and 7324-7328) which limit the political activities of employees whose principal employment activities are funded in whole or in part with Federal funds.

9. Will comply, as applicable, with the provisions of the Davis-Bacon Act (40 U.S.C. 276a to 276a-7), the Copeland Act (40 U.S.C. 276c and 18 U.S.C. 874), and the Contract Work Hours and Safety Standards Act (40 U.S.C. 327-333), regarding labor standards for federally-assisted construction subagreement.

10. Will comply, if applicable, with flood insurance purchase requirements of Section 102(a) of the Flood Disaster Protection Act of 1973 (P.L. 93-234) which requires recipients in a special flood hazard area to participate in the program and to purchase flood insurance if the total cost of insurable construction and acquisition is $10,000 or more.

11. Will comply with environmental standards which may be prescribed pursuant to the following: (a) institution of environmental quality control measures under the National Environmental Policy Act of 1969 (P.L. 91-190) and Executive Order (EO) 11514; (b) notification of violating facilities pursuant to EO 11738; (c) protection of wetlands pursuant to EO 11990; (d) evaluation of flood hazards in flood plains in accordance with EO 11988; (e) assurance of project consistency with the approved State management program developed under the Coastal Zone Management Act of 1972 (16 U.S.C. 1451 et seq.); (f) conformity of Federal actions to State (Clean Air) Implementation Plans under Section 176(c) of the Clean Air Act of 1955, as amended (42 U.S.C. 7401 et seq.); (g) protection of underground sources of drinking water under the Safe Drinking Water Act of 1974, as amended (P.L. 93-523); and, (h) protection of endangered species under the Endangered Species Act of 1973, as amended (P.L. 93-205).

12. Will comply with the Wild and Scenic Rivers Act of 1968 (16 U.S.C. 1271 et seq.) Related to protecting components or potential components of the national wild and scenic rivers system.

13. Will assist the awarding agency in assuring compliance will Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S.C. 470), EO 11593 (identification and protection of historic properties), and the Archaeological and Historic Preservation Act of 1974 (16 U.S.C. 469a-1 et seq.).

14. Will comply with P.L. 93-348 regarding the protection of human subjects involved in research, development, and related activities supported by this award of assistance.

15. Will comply with the Laboratory Animal Welfare Act of 1966 (P.L. 89-544, as amended, 7 U.S.C. 2131 et seq.) Pertaining to the care, handling, and treatment of warm blooded animals held for research, teaching, or other activities supported by this award of assistance.

16. Will comply with the Lead-Based Paint Poisoning Prevention Act (42 U.S.C. 4801 et seq.) Which prohibits the use of lead-based paint in construction or rehabilitation of residence structures.

17. Will cause to be performed the required financial and compliance audits in accordance with the Single Audit Act Amendments of 1996 and OMB Circular No. A-133, "Audits of States, Local Governments, and Non-Profit Organizations."

18. Will comply with all applicable requirements of all other Federal laws, executive orders, regulations, and policies governing this program.

SIGNATURE OF AUTHORIZED CERTIFYING OFFICIAL	TITLE
Nadine P Hitchcock	Executive Officer
APPLICANT ORGANIZATION	DATE SUBMITTED
California State Coastal Conservancy	6-30-11

EPA United States Environmental Protection Agency

11-031
EPA Project Control Number

CERTIFICATION REGARDING LOBBYING

CERTIFICATION FOR CONTRACTS, GRANTS, **LOANS AND COOPERATIVE AGREEMENTS**

The undersigned certifies, to the best of his or her knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all sub-awards at all tiers (including sub-contracts, sub-grants, and contracts under grants, loans, and cooperative agreements) and that all sub-recipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31 U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

Samuel Schuchat, Executive Officer
Typed Name & Title of Authorized Representative

Nadine P. Hitchcock
Signature and Date of Authorized Representative

FORM Approved By OMB: No. 2030-0020 Expires 04-30-2012

Preaward Compliance Review Report for
All Applicants and Recipients Requesting EPA Financial Assistance
Note: Read instructions on other side before completing form.

I.	Applicant/Recipient (Name, Address, State, Zip Code). California State Coastal Conservancy	DUNS No. 808322408000
II.	Is the applicant currently receiving EPA assistance? Yes	
III.	List all civil rights lawsuits and administrative complaints pending against the applicant/recipient that allege discrimination based on race, color, national origin, sex, age, or disability. (Do not include employment complaints not covered by 40 C.F.R. Parts 5 and 7. See instructions on reverse side.) None	
IV.	List all civil rights lawsuits and administrative complaints decided against the applicant/recipient within the last year that allege discrimination based on race, color, national origin, sex, age, or disability and enclose a copy of all decisions. Please describe all corrective action taken. (Do not include employment complaints not covered by 40 C.F.R. Parts 5 and 7. See instructions on reverse side.) None	
V.	List all civil rights compliance reviews of the applicant/recipient conducted by any agency within the last two years and enclose a copy of the review and any decisions, orders, or agreements based on the review. Please describe any corrective action taken. (40 C.F.R. § 7.80(c)(3)) None	
VI.	Is the applicant requesting EPA assistance for new construction? If no, proceed to VII; if yes, answer (a) and/or (b) below. ✓ Yes No a. If the grant is for new construction, will all new facilities or alterations to existing facilities be designed and constructed to be readily accessible to and usable by persons with disabilities? If yes, proceed to VII; if no, proceed to VI(b). ✓ Yes No b. If the grant is for new construction and the new facilities or alterations to existing facilities will not be readily accessible to and usable by persons with disabilities, explain how a regulatory exception (40 C.F.R. § 7.70) applies. ✓ Yes No	
VII.*	Does the applicant/recipient provide initial and continuing notice that it does not discriminate on the basis of race, color, national origin, sex, age, or disability in its programs or activities? (40 C.F.R. § 5.140 and § 7.95) ✓ Yes No a. Do the methods of notice accommodate those with impaired vision or hearing? Yes ✓ No b. Is the notice posted in a prominent place in the applicant's offices or facilities or, for education programs and activities, in appropriate periodicals and other written communications? ✓ Yes No c. Does the notice identify a designated civil rights coordinator? Yes ✓ No	
VIII.*	Does the applicant/recipient maintain demographic data on the race, color, national origin, sex, age, or handicap of the population it serves? (40 C.F.R. § 7.85(a)) No	
IX.*	Does the applicant/recipient have a policy/procedure for providing access to services for persons with limited English proficiency? (40 C.F.R. Part 7, E.O. 13166) Yes	
X.*	If the applicant/recipient is an education program or activity, or has 15 or more employees, has it designated an employee to coordinate its compliance with 40 C.F.R. Parts 5 and 7? Provide the name, title, position, mailing address, e-mail address, fax number, and telephone number of the designated coordinator. Yes, Ms. Regine Serrano, Chief of Administration, (510) 286-4349,	
XI*	If the applicant/recipient is an education program or activity, or has 15 or more employees, has it adopted grievance procedures that assure the prompt and fair resolution of complaints that allege a violation of 40 C.F.R. Parts 5 and 7? Provide a legal citation or Internet address for, or a copy of, the procedures. Yes; http://www.dfeh.ca.gov/Complaints.htm.	

For the Applicant/Recipient

I certify that the statements I have made on this form and all attachments thereto are true, accurate and complete. I acknowledge that any knowingly false or misleading statement may be punishable by fine or imprisonment or both under applicable law. I assure that I will fully comply with all applicable civil rights statutes and EPA regulations.

A. Signature of Authorized Official	B. Title of Authorized Official	C. Date
Nadine R. Hitchcock	Executive Officer	6-30-11

For the U.S. Environmental Protection Agency

I have reviewed the information provided by the applicant/recipient and hereby certify that the applicant/recipient has submitted all preaward compliance information required by 40 C.F.R. Parts 5 and 7; that based on the information submitted, this application satisfies the preaward provisions of 40 C.F.R. Parts 5 and 7; and that the applicant has given assurance that it will fully comply with all applicable civil rights statutes and EPA regulations.

A. Signature of Authorized EPA Official	B. Title of Authorized EPA Official	C. Date
See ** note on reverse side		

Form Approved OMB No:2030-0020 Approval Expires 04/2012

KEY CONTACTS FORM

Authorized Representative: *Original awards and amendments will be sent to this individual for review and acceptance, unless otherwise indicated.*

Name: Samuel Schuchat
Title: Executive Officer
Complete Address: 1330 Broadway, 13th Floor
Oakland, CA 94612-2530
Phone Number: 510-286-1015

Payee: *Individual authorized to accept payments.*

Name: Hong Truong
Title: Accounting Administrator I
Mail Address: 1330 Broadway, 13th Floor
Oakland, CA 94612-2530
Phone Number: 510-286-4015

Administrative Contact: *Individual from Sponsored Program Office to contact concerning administrative matters (i.e., indirect cost rate computation, rebudgeting requests etc.)*

Name: Sean Williamson
Title: Grants Manager
Mailing Address: 1330 Broadway, 13th Floor
Oakland, CA 94612-2530
Phone Number: 510-286-0754
FAX Number: 510-286-0470
E-Mail Address: swilliamson@scc.ca.gov

Principal Investigator: *Individual responsible for the technical completion of the proposed work.*

Name: Jeff Melby
Title: Project Manager
Mailing Address: 1330 Broadway, 13th Floor
Oakland, CA 94612-2530
Phone Number: 510-286-4088
FAX Number: 510-286-0470
E-Mail Address: jmelby@scc.ca.gov
Web URL: www.scc.ca.gov

Workplan for
Emerson Parcel Portion of the Dutch Slough Tidal Marsh Restoration Project

1) PROJECT TITLE:
Emerson Parcel Portion of the Dutch Slough Tidal Marsh Restoration Project

2) CONTACT INFORMATION:

California State Coastal Conservancy
Jeff Melby, Project Manager
1330 Broadway, 13th Floor
Oakland, CA 94612-2530
510-286-4088
Email: jmelby@scc.ca.gov

California Department of Water Resources
Patty Quickert, Project Manager
Flood Environmental Stewardship and Statewide
Resources Office (FESSRO)
1416 9th Street Room 1623
Sacramento, CA 94560
(916) 651-0851
Email: pattyq@water.ca.gov

3) ROLES AND RESPONSIBILITIES
There are several committees involved in the planning of the Dutch Slough project.

- A Management Team meets regularly to discuss and make decisions on all issues related to project planning and implementation. Staff of State Coastal Conservancy (SCC), Department of Water Resources (DWR), Reclamation District (RD) 2137, and the design contractors (ESA PWA) make up the Management Team.
- An Executive Committee meets approximately twice per year to discuss project progress and make decisions on high-level issues. The Executive Officer of the SCC, a Deputy Director and other managers from DWR, and a Branch Chief and other managers from the California Department of Fish and Game make up the Executive Committee.
- A Technical Advisory Team meets approximately annually to address questions related to the ecological aspects of project design. Scientific experts from many disciplines make up the Technical Advisory Team.

The California State Coastal Conservancy (SCC), established in 1976, is a state agency that uses entrepreneurial techniques to purchase, protect, restore, and enhance coastal resources, and to provide access to the shore. To date, the Conservancy has undertaken more than 1,800 projects

along the California coastline and around San Francisco Bay. The SCC has partnered with various state and federal agencies on major wetland restoration projects within the San Francisco Bay estuary, including the Hamilton Wetlands, the Napa-Sonoma Marsh and the South Bay Salt Ponds.

The SCC has been planning the Dutch Slough Restoration project since 2002 and currently serves a supporting role in assisting DWR and Reclamation District 2137 in implementing the project. SCC intends to provide $5M for implementation, in addition to the $5M SCC contributed to the acquisition and approximately $0.5M for planning. SCC also administered a $1.5M grant from the CALFED Ecosystem Restoration Program (ERP) for initial project planning.

The Department of Water Resources owns the project site, is the California Environmental Quality Act (CEQA) Lead Agency, is active in all project planning efforts, and is the primary funding partner. DWR will provide at least $14M in funding for project planning and implementation, and has a full-time staff person (Patty Quickert) dedicated to the Dutch Slough project. Ms. Quickert is in charge of all day-to-day activities related to the Dutch Slough project including meeting attendance, coordination with other agencies, document preparation, coordination with the design contractors, arranging and participating in biological surveys, and public outreach (in 2011, presentations have been given to the Oakley City Council, Friends of Marsh Creek Watershed, and to over 100 attendees of the Water Education Foundation's 2-day Bay-Delta Tour). DWR is in charge of all actions not funded by grants received by SCC. DWR funding comes from state Propositions 84 and 1e bond sales. These funds are administered through the Delta Levees Special Projects Program, which provides grants to local agencies (Reclamation Districts) for levee work, associated mitigation, and for net improvement of Delta habitats. The Dutch Slough project is a habitat improvement project, funded by DWR via grants to Reclamation District 2137, which encompasses two of the three Dutch Slough parcels.

The local agency responsible for the maintenance of the levees around the Emerson and Gilbert parcels of the Dutch Slough project site is RD 2137. (The third parcel, Burroughs, is part of a separate RD.) Reclamation District boards are made up of landowners within the RD. Two of the three trustees on the RD 2137 Board are DWR employees; the third is the owner of a small parcel that will be deeded to the City of Oakley for development of a Community Park. Because the bond funds provided by DWR must be granted only to local agencies, RD 2137 is the agency that will be a party to all contracts necessary to complete the Dutch Slough project. A representative of the RD is an active member of the Management Team.

The Department of Fish and Game is a funding partner for project planning and implementation. For the purchase of the project site, the CALFED Ecosystem Restoration Program (ERP) provided $23M. The ERP is now part of DFG, and $5.9M has been budgeted by ERP for the Dutch Slough project. Representatives from DFG management attend Executive Committee meetings.

The contracting firm ESA PWA (formerly named PWA or Philip Williams and Associates) was hired by RD 2137 in 2009 to complete the design planning for the Dutch Slough project. The design team also includes a number of subcontractors to ESA PWA. It is expected that the ESA PWA design team will be on contract at least through completion of project construction (levee breaching).

4) SUMMARY OF WORK SCOPE/OVERALL SUMMARY:

Dutch Slough Project

The Dutch Slough Tidal Marsh Project will restore tidal marsh and associated wetland, riparian, and terrestrial habitats on 1,178 acres near Oakley in eastern Contra Costa County (Figure 1 in Attachment A). The Project site is adjacent to Dutch Slough and the mouth of Marsh Creek in the western Delta. For over a hundred years, the property has been diked and used for grazing and dairy operations. The size, elevation, and location of the Dutch Slough site offers a significant opportunity to restore a mosaic of habitats to benefit native species while also creating compatible public access to the shoreline of the Delta.

The Project site consists of three leveed parcels (Figure 2 in Attachment A). All three parcels slope downward from south to north, and elevations range from about 10 feet below mean sea level to about 10 feet above. The Project will restore approximately 640 acres of tidal marsh and riparian floodplain habitat, 90 acres of subtidal open water habitat, 100 acres of managed nontidal marsh for California Black Rail habitat enhancement and subsidence reversal, and 240 acres of enhanced irrigated pasture (Figure 2 in Attachment A). The Emerson parcel portion will restore 270 acres of intertidal marsh, 20 acres of riparian woodland and scrub, and 100 acres of open tidal waters.

Emerson Parcel Portion

Tidal marsh and riparian floodplain habitats. The southern (higher elevation) part of the parcel will be restored to tidal marsh. Because of the low elevations in the northeast part of the parcel, it is not economical to fill and restore it to tidal marsh. Instead, it will be separated from the tidal marsh areas by a new berm and breached to Emerson Slough to create an area of open subtidal water. Beginning in 2013, areas currently at elevations above those appropriate for intertidal marsh (>mean higher high water, ~3 feet) will be excavated down to marsh elevations. The excavated material will be used to fill lower elevation areas and increase the acreage at elevations appropriate for intertidal marsh. In 2014, after excavation and fill, grading will create marshplain as well as berms to separate tidal marsh areas from the open water area at the northeast corner of the parcel. Riparian floodplain (elevation ~5 feet) will be created adjacent to Marsh Creek, and planted with appropriate riparian trees and shrubs. During 2015 and 2016, planted vegetation will be managed through irrigation and control of invasive weedy species. During this same time period, water levels will be managed in intertidal marsh areas to facilitate growth of emergents (cattails and tules). It is expected that this will result in more emergent plant cover than would naturally germinate under tidal conditions, because tidal water depths in low marsh area will be too deep to allow germination of emergent plant species. Breaching is scheduled to occur in 2017.

Marsh Creek Delta. A channelized creek flows along the west boundary of the Emerson parcel. Marsh Creek will be re-routed onto the parcel to restore the creek delta, and provide seasonal freshwater flows to cue outmigrating salmon smolts into the restored marsh. Creating one large, contiguous marsh habitat connected to Marsh Creek on Emerson is expected to provide significant ecological values. The new Marsh Creek distributary channel constructed through the Emerson marsh will have low riparian berms or "natural levees" along the channel banks. The goal of riparian berms is to establish riparian scrub and cottonwood-willow riparian forest along Marsh Creek. The riparian vegetation will benefit fish and other aquatic species and functions by shading the creek and lowering summer temperatures, providing organic inputs such as leaves and branches that may fall or hang into the channel, and providing insects and other invertebrates that fall from the vegetation into the channel. Figure 2 in Attachment A shows a conceptual sketch of the restored Marsh Creek delta configuration.

Similarly, portions of the existing Emerson perimeter levees will be re-graded and/or planted with riparian vegetation to restore riparian "habitat levees". In addition to providing riparian habitat for terrestrial species, habitat levee riparian vegetation will provide shading and organic input to both the restored marsh and open water channels.

Subtidal open water habitat. The area of lowest elevation on the northern part of the Emerson parcel will be breached to Emerson Slough to create subtidal open water. A berm will be constructed to separate this area from the adjacent intertidal marsh, primarily to minimize movement of nonnative species (especially bass and Brazilian waterweed) from the open water to the tidal marsh. The open water will enhance the recreational components of the Emerson parcel (trail and interpretive signs) by providing an area for fishing and non-motorized boating.

Water Quality Monitoring. Pre-project baseline monitoring will commence in 2011 and continue until breaching in 2017. Monitoring will include the following:

- Measure concentrations of methyl mercury (MeHg), total organic carbon (TOC), and dissolved organic carbon (DOC) in drainage ditches on all three parcels and estimate loads using power derived flow estimates. Grab samples in drainage ditches will be collected monthly.
- Measure TOC and DOC concentrations monthly in the sloughs adjacent to the site.
- Monitor Marsh Creek water quality for MeHg, DOC, TOC, pesticides, pharmaceuticals, and personal care products and trace elements. Monitoring will include unfiltered and filtered samples event and discharge weighted sampling based on flow measurements.

5) PROJECT WORKPLAN:

Emerson Parcel Portion

The Emerson Parcel is scheduled to breach in 2017; however, the EPA Grant term is only through 2015. Tasks are described below and the budget years for each task are explicitly identified. A detailed Budget and Schedule Table for all tasks is in Attachment B. A table summarizing the schedule of milestones and deliverables is in Attachment C.

Task 1. Project Management/Administration (2011-2017)
This task includes SCC administration to ensure compliance with grant conditions, reporting requirements, and invoicing. Reporting requirements include quarterly reports and a final report containing an assessment of how effective the project was in achieving the stated environmental objectives. The SCC will continue to assist DWR in managing the project and coordinate with Project agencies and stakeholders as needed, including participating in periodic Management Team, Executive Committee, and Technical Advisory Team meetings and public outreach. The staff labor is included in italics in the budget. Details on labor rates and federal approved indirect rates are described in Attachment D. Total estimated cost for Emerson Parcel portion 2011-2017: $120,000. Non-federal funds (match plus leverage) is in kind: $180,000, (60%). Federal (EPA) funds: $120,000.

Task 2. Infrastructure Relocation (2014-2015)
A pipeline carrying secondary-treated effluent is present in the toe of the levee that passes along the northwest quarter of the Emerson parcel. Before the parcel can be graded or breached, this pipe must be moved and buried in the crown of the levee. Total cost 2014: $456,000. Non-federal funds (match plus leverage) is 100%. No Federal funds.
Pipeline replacement design: Dec 2014
Bid advertisement: early April 2015
Select contractor: late April 2015
Begin construction: May 2015
End construction: Sept 2015

Task 3. Design and Engineering (2011-2017)
Final project designs and grading plans are still being completed; we are currently (June 2011) at 20% design. The design engineers, ESA PWA, and their subcontractors, will be involved in this project until its completion. Total cost 2011-2017 is estimated at $547,000. Non-federal funds (match plus leverage) are 100%. No Federal funds.
Marsh Creek modeling: Dec 2011
30% design drawings for Dutch Slough project: Sept 2011
80% design drawings for Dutch Slough project: Feb 2012
Design of all new levees for Dutch Slough project: Dec 2012
Grading plan for Emerson parcel: Feb 2013
100% design drawings for Emerson parcel: June 2013
Emerson Construction supervision: July 2013-Oct 2017

Task 4. Water Quality Monitoring (2011-2017)
Pre-project water quality monitoring will begin in 2011 and continue until breaching in 2017. At that time, post-project monitoring will commence. Budget estimates here are for pre-project monitoring only. A contractor is already hired to complete this work. Total cost 2011-2017 is $630,000. Non-federal funds (match plus leverage) are $330,000 (55%). Federal (EPA) funds, $300,000.
Final Water Quality monitoring plan (deliverable): Aug 2011
Begin water quality monitoring: Sept 2011
Preparation of QAPP (deliverable): March 2012

Annual report due each year (deliverable): Dec 2012-2017

Task 5. Site Preparation (2013)
Includes mobilization, construction survey, and initial grading of the Emerson parcel to remove vegetation, prior to creating marsh plain and marsh channels. *The construction contract for this work will cover both Task 5 and 6a.* Total cost: $910,000. Non-federal funds (match plus leverage) are 100%. No Federal funds.
Bid advertisement for site prep: early April 2013
Select contractor: late April 2013
Begin site prep: May 2013
End site prep: June 2013

Task 6. Construction 2013-2017 (detailed costs below)
a. Marshplain and Marsh Creek channel grading. Grading is by far the largest expense in this restoration project. Hundreds of thousands of cubic yards of material will be cut-and-filled on the Emerson parcel to increase the acreage at elevations appropriate for tidal marsh. The marsh plain must be finely graded so that it floods and drains with each tidal cycle. Tidal channels must be excavated to the proper depth and shape. These activities will occur during 2013 and 2014, and *will be done under the same contract as Task 5* (Site Preparation). Total cost is $8,150,000. Non-federal funds (match plus leverage) are $6,170,900 (76%). Federal (EPA) funds $1,008,600 (12%). Total Federal funds (with USFWS grant) are $1,858,600.
Phase 1 marsh grading (on-site cut and fill): Sept 2013
Phase 2 marsh grading (grade to marshplain elevations): July 2014
Phase 3 marsh grading (cut channels and create berms): Aug 2014

b. Water control structures and revegetation management. For water management of the marsh areas during pre-breach revegetation, water control structures (either pumps or siphons) will be required. Post-planting management of marsh, riparian, and upland areas will include weed control, replacement of lost plantings, and protection from pests. Tasks 6c, d and e are likely to be done under one contract. Total cost: $150,000. No federal funds.
Install water control structures: August 2014
Plant maintenance events, monthly: Oct 2014-Sept 2017

c. Marsh revegetation (tule pre-establishment). After grading, and before breaching, the site will be revegetated. Using pumps and/or siphons, marsh areas will be irrigated and water levels managed to encourage the growth of emergent tules and cattails. This will be done primarily to establish vegetation in areas of low marsh elevation where natural recruitment under tidal conditions may be slow due to the depth of tidal inundation. Established vegetation is expected to persist after breaching. Marsh areas will be managed (water levels and invasive plants controlled, plus possible planting if natural establishment is inadequate) from 2014 until breaching in 2017. Total cost is $201,400. This task will be paid for completely by federal dollars; there is no non-federal match. EPA funds (2014-2015): $101,400 (50.4%). USFWS funds (2014-2017): $100,000 (49.6%)
Install water control structures (Task 6d) and begin managing water levels: Aug 2014
Monthly (or semi-monthly) management/assessment visits: Sept 2014-July 2017

d. Riparian and native grassland revegetation. During grading, low berms will be created along the Marsh Creek channel where it enters the Emerson parcel, and a strip of higher elevation along the southern end of the parcel will remain as upland transition. Prior to breaching, these areas will be planted with native species. Riparian trees and shrubs will be planted along the Marsh Creek berms and along the parcel's perimeter levee (which will remain as a public access trail). Native grasses will be planted in the upland transition zone and on levee slopes. Drip irrigation will be installed where necessary. Tasks 6c, d, and e are likely to be done under one contract. Total cost 2014-2017: $812,400. Non-federal funds (match plus leverage) (2014-2017): $542,400 (67%). Federal (all EPA) funds (2014-2015): $270,000 (33%).
Bid advertisement for revegetation: early June 2014
Select contractor: late June 2014
Site preparation (weed control, soil preparation, install temporary irrigation): Aug 2014
Purchase and plant container plants: Sept 2014

e. Habitat levees. Some of the material excavated from the Emerson parcel will be used to create 4:1 slopes on the landside of the existing levee. These flatter slopes will be planted with native species to provide habitat and transitional zones at the marsh edge. Tasks 6c, d and e are likely to be done under one contract. Total cost $31,500. No federal funds.
Construction of habitat levees (Phase 2 marsh grading): July 2014
Purchase and plant container plants: Sept 2014

f. Two levee breaches. Marsh Creek will be re-routed onto the Emerson parcel, and the existing levee will be breached near the parcel's southwest corner to begin the re-route, and the creek waters will exit the site (and tidal waters enter) at a second breach to Dutch Slough on the north side of the parcel. Bridges will be installed over the breaches. Total cost $580,000. Non-federal funds (match plus leverage) are $530,000 (91%). Federal (USFWS) funds $50,000. Because these breaches will not occur until 2017, there will be no EPA funds for this task.
Bid advertisement for levee breaching: early July 2017
Select contractor: late July 2017
Breach levees: Aug 2017

6) Monitoring Strategies

General framework for pre- and post-project monitoring
Formal monitoring plans have been developed only for groundwater and surface water. To document baseline use of the site by sensitive species, monitoring for several biotic components are ongoing or have been completed.

Vegetation success

Rationale for monitoring: Measure success of tule establishment and native plantings, and use data to determine what management actions need to be taken (such as replacement plantings, control of invasive weeds, changes in irrigation frequency and duration).
Post-project monitoring: After project implementation, plant surveys will focus on success of tule cultivation and planted areas, and occurrence of invasive nonnative weeds. In areas of tule cultivation, success of water management will be assessed by visual surveys of germination and spread of tules and cattails. These visual surveys will also determine when control of invasive

weeds is needed. In areas planted with riparian trees and shrubs or native grasses, surveys will focus on survival of plants and occurrence of invasive weeds. In all areas, plant survey data will be used to determine when management actions are needed.

Fish

(this monitoring is key to measuring success of the project, but it will not be funded by EPA funds, and it will not be included in the QAPP)

Pre-project baseline monitoring: We do not expect to do any pre-project fish monitoring as there currently is no fish habitat on the project site.

Rationale for monitoring: The restored tidal marshes and channels are expected to provide rearing habitat for juvenile Chinook salmon and spawning and rearing habitat for Sacramento splittail; post-project monitoring will measure the accuracy of these hypotheses. It will also measure which microhabitats within the restoration are utilized by which species and life stage. These data will be useful in developing objectives and designing future Delta restoration projects.

Post-project monitoring: Fish use of the Project site will be monitored to assess use of the site by native species, primarily Chinook salmon (rearing), Sacramento splittail (spawning and rearing). We have not yet developed a formal fish monitoring plan; it is expected that this will be done in cooperation with USFWS, NOAA Fisheries, and DFG.

Surface water quality

Monitoring of surface water quality will begin in approximately August 2011. A draft pre-project monitoring plan is summarized below, and attached as Attachment E.

Pre-project baseline monitoring: Measure concentrations of MeHg (as per Sloten et. al., 2006)[1], TOC and DOC in drainage ditches; monitor Marsh Creek water quality for MeHg, DOC, TOC, pesticides, pharmaceuticals and personal care products, trace elements and field parameters (pH, conductivity, dissolved oxygen, turbidity).

Methods: See attached Draft monitoring plan.

Rationale for monitoring: To measure baseline and post-project water quality conditions, then compare the two to assess project impacts on local water quality. These data will be critical in designing future Delta restoration projects so that they may optimize water quality benefits and minimize water quality impairments.

Post-project monitoring: Measure MeHg, DOC and TOC concentrations and flow at selected locations within selected marsh areas; in the sub-tidal open water area on Emerson measure nutrients (nitrogen and phosphorus species), pH, dissolved oxygen, conductivity, temperature chlorophyll; biosentinel monitoring for MeHg.

[1] Slotton, DG, SM Ayers, and RD Weyand (2006) CBDA Biosentinel Mercury Monitoring Program – First Year Draft Data Report Covering Sampling Conducted August 2005- February 2006. UC Davis Dept. Envir. Sci. & Policy. June 6. 73 pp.

7) BUDGET SUMMARY INCLUDING MATCHING FUNDS

Task	Total Cost Estimate	Year(s) of Expense	USEPA WQIF	SCC
1. Project Management	120,000	2011-2015	120,000	in-kind
2. Infrastructure Relocation	456,000	2014		152,000
3. Design and engineering fees	547,000	2011-2017		182,000
4. Water Quality Monitoring	630,000	2011-2017	300,000	110,000
5. Site preparation	910,000	2013-2017		303,300
6. Construction	8,150,900	2013-2017	980,000	2,006,900
Total	**$10,813,900**		**$1,400,000**	**$ 2,754,200**

8) PROJECT OUTCOMES:

The outputs and outcomes of the Emerson Parcel tidal restoration are described in the table below and in Attachment F.

Project Outputs	Outcomes	How Progress will be Tracked/Measured
Eliminate cattle grazing on 1,166 acres. (Will occur prior to Task 6)	Improve water quality by reducing export of nitrates and pathogens.	Water quality monitoring (Task 4) will be conducted both pre- and post-project, though pre-project water quality monitoring has not yet begun. Post-project release of nitrates and pathogens (such as E. coli, and coliform bacteria) will be compared to pre-project levels.
Pre-breach revegetation of 35 acres of riparian woodland and scrub. (Task 6d)	Control nonnative invasive plant species. Create 35 acres of habitat for native species (primarily birds).	Vegetation monitoring to measure survival and growth of plantings, and presence of invasive exotics.
Reestablish Marsh Creek Delta and hydrologic processes by routing Marsh Creek onto Project site. New delta will replace straightened, channelized stream bed (approximately 1.25 miles) with sinuous dendritic channels (approximately 2.5 miles).	Create freshwater signal to attract native fishes to spawning/rearing habitats. By decreasing flow rates, stream meanders will reduce erosion, improve sedimentation, and create channel and bank habitat used by native species.	Fish use of the Project site will be monitored to assess use of the site by native species, primarily Chinook salmon (rearing), Sacramento splittail (spawning and rearing). Surveys will use seines or trawls and numbers of each species will be recorded. It is not yet known how often these surveys will occur. Annual topographic transects of restored Marsh Creek Delta to quantify area and volume of erosion and sedimentation. (Monitoring protocols for these physical factors have not been prepared; these monitoring elements will not be funded with Federal or match funds).
Breach levees to reintroduce tidal action and reestablish a supply of natural freshwater flows and fluvial sediments to approximately 860 acres of the Project site.	Attract spawning and rearing native fishes to restored habitats. Exchange water, sediments and nutrients with adjacent Delta. Contribute to primary productivity and enhance food supply for sensitive pelagic species potentially including Delta smelt and longfin smelt through export of	Fish use of the Project site will be monitored to assess use of the site by native species, primarily Chinook salmon (rearing), Sacramento splittail (spawning and rearing). Surveys will use seines or trawls and numbers of each species will be recorded. Water quality monitoring to include measures of turbidity and chlorophyll to estimate flux of sediment and carbon to and from restored marshes. Trophic transfer from restored marsh to pelagic species is a priority question for Delta restoration, but we have not yet developed study design.

	nutrients.	
Restore tidal channels. (Actual length of channels will be determined in final design, but will exceed 5 miles.)	Habitat for sensitive native species (rearing habitat for Chinook salmon, rearing and spawning habitat for Sacramento splittail, and potentially spawning habitat for Delta smelt). Increase growth and survival of juvenile salmon and splittail.	Fish use of the Project site will be monitored to assess use of the site by native species, primarily Chinook salmon (rearing), Sacramento splittail (spawning and rearing). Surveys will use seines or trawls and numbers of each species will be recorded. It is not yet known how often these surveys will occur.
Restore approximately 570 acres of freshwater intertidal marsh.	Habitat for sensitive native species (spawning habitat for Sacramento splittail, California Black Rail, Tricolored blackbird). Increase local biodiversity. Export nutrients and increase primary productivity. Filter pollutants from terrestrial runoff and improve water quality.	It may be difficult or impossible to sample fish in the vegetated marsh as opposed to tidal channels, but it may be possible to track radio-tagged gravid female splittail to determine if and where they spawn on the marsh plain. Avian use of newly restored habitats will be incorporated into ongoing annual bird surveys. During surveys all detections are recorded though the focus is on sensitive species and nesting behavior. (Avian surveys are currently underway and will continue post-breaching; these surveys are funded entirely by DWR, not by Federal or match funds) Results of these surveys will be the only way of estimating changes in biodiversity; invertebrates and soil organisms will not be sampled. Water quality in Marsh Creek will be monitored upstream and downstream of the restored area.
Restore 35 acres of riparian woodland and scrub-shrub.	Nesting habitat for sensitive native species (Swainson's Hawk, Loggerhead Shrike). Increase local biodiversity.	Avian use of newly restored habitats will be incorporated into ongoing annual bird surveys. During surveys all detections are recorded though the focus is on sensitive species and nesting behavior. (Avian surveys are currently underway and will continue post-breaching; these surveys are funded entirely by DWR, not by Federal or match funds.)
Restore approximately 2 miles of shaded riverine aquatic habitat.	Habitat for sensitive native species (Chinook salmon, Sacramento splittail).	Fish use of the Project site will be monitored to assess use of the site by native species, primarily Chinook salmon (rearing), Sacramento splittail (spawning and rearing). Surveys will use seines or trawls and

		numbers of each species will be recorded. Precise study design to be determined.
Preserve and enhance up to 100 acres of managed freshwater marsh.	Protect and expand habitat for state Threatened CA Black Rail. Reverse subsidence.	Annual estimates of the number of rails occupying the managed marsh will be made both pre- and post-project. Peat accrual will be measured with periodic transects and a sedimentation-erosion table (SET). (Monitoring of both rails and subsidence reversal will be done using DWR funds only.)
Contribute to scientific understanding of ecological restoration by implementing the project under an adaptive management framework.	Comparison of marsh areas of different sizes (small, 10-15 acres; medium, 30-40 acres; and large, 80-90 acres) and different elevations (low marsh at mean lower low water, and mid marsh at mean tide level), would indicate optimal sizes and elevations of new restoration projects.	Hypotheses regarding the role of marsh plain elevation and scale will be tested by comparing how the different marsh parcels affect factors such as native fish growth and survival, primary productivity, and methylmercury production and export. (These adaptive management experiments will be funded completely by external entities.)
Design and construct the project with minimal high marsh habitat, because these areas, with frequent wetting and drying, can be sources for mercury methylation.	Minimize production and export of methyl mercury.	Monitor water and biota for methyl mercury both on-site, and in areas affected by water draining off the project site.

Attachment A
Project Location and Design

Figure 1. Location of the Dutch Slough Tidal Marsh Restoration Project

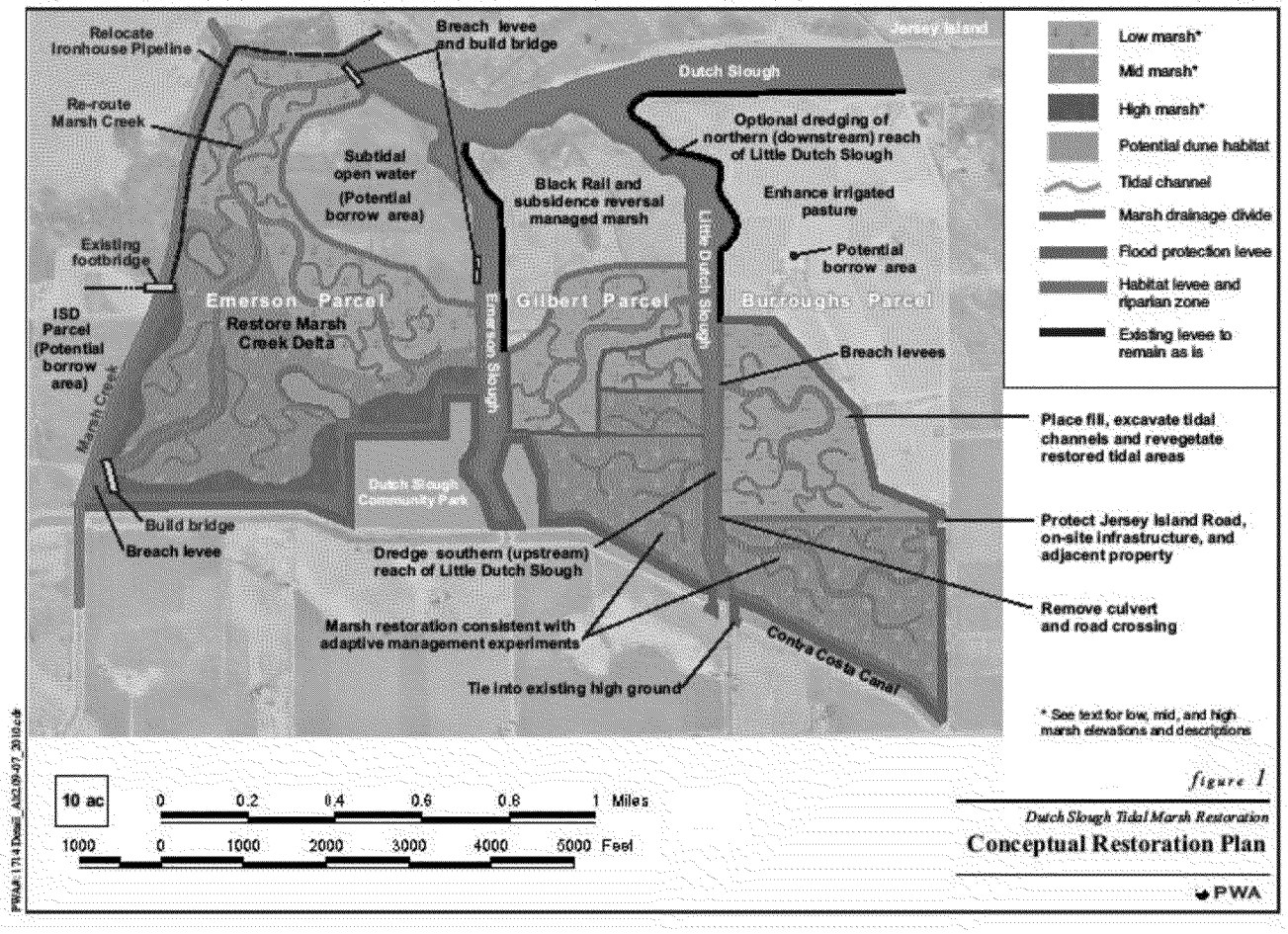

Figure 2. Conceptual Design of the Dutch Slough Tidal Marsh Restoration Project

Attachment B

Detailed Task, Schedule and Budget Table

Task	Total Cost Estimate	Year(s) of Expense	USEPA WQIF	USFWS NCWC Grant	SCC	DWR	DFG
1. Project Management	120,000	2011-2015	120,000		in kind	in kind	in kind
2. Infrastructure Relocation	456,000	2014			152,000	152,000	152,000
3. Design and engineering fees	547,000	2011-2017			182,000	183,000	182,000
4. Water Quality Monitoring	630,000	2011-2017	300,000		110,000	110,000	110,000
5. Site preparation	910,000	2013-2017			303,300	303,400	303,300
6. Construction (details below)	8,150,000	2013-2017	980,000	1,000,000	2,006,900	2,157,100	2,006,900
a. Marshplain and Marsh Creek channel grading	6,375,600	2013-2014	608,600	850,000	1,605,600	1,705,800	1,605,600
b. Water control structures and reveg management	150,000	2015-2017			50,000	50,000	50,000
c. Marsh revegetation (tule pre-establishment)	201,400	2014-2017	101,400	100,000	0	0	0
d. Riparian and native grassland planting	812,400	2014-2017	270,000		180,800	180,800	180,800
e. Habitat levees	31,500	2016			10,500	10,500	10,500
f. Two levee breaches	580,000	2017		50,000	160,000	210,000	160,000
Total	$10,813,900		$1,400,000	$1,000,000	$ 2,754,200	$ 2,905,500	$ 2,754,200

Attachment C

Schedule of Dutch Slough Milestones and Deliverables ***(years are calendar years, and timeline is for completion of each listed task)***

Project Milestones and Deliverables	Year 1 - 2012				Year 2 - 2013				Year 3 - 2014				Year 4 - 2015			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Task 1. Project Management, Administration, and Reporting:																
Quarterly Progress Reports to USEPA	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Draft Project Report to USEPA															■	
Final Project Report to USEPA																■
Task 2. Infrastructure Relocation:																
Pipeline replacement design												■				
Bid advertisement for pipeline replacement														■		
Select contractor														■		
Begin construction														■		
End construction															■	
Task 3. Design and Engineering																
80% design drawings	■															
Excavation plan for borrow site (Ironhouse parcel)		■														
Design of Marsh Creek crossing (to allow transport of borrow from Ironhouse to Dutch Slough)		■														
Design of all new levees for Dutch Slough Project				■												
Grading plan for Emerson parcel					■											
100% design drawings for Emerson parcel						■										
Emerson construction supervision							■	■	■	■	■	■	■	■	■	■
Task 4. Water Quality Monitoring:																
Draft Quality Assurance Project Plan (QAPP)	■															

Project Milestones and Deliverables	Year 1 - 2012				Year 2 - 2013				Year 3 - 2014				Year 4 - 2015			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
USEPA Approval of QAPP			■													
Water Quality Monitoring (pre-project)	■	■	■													
Annual Report				■												
Task 5. Site Preparation:																
Bid advertisement for site prep						■										
Select contractor						■										
Begin site prep							■									
End site prep																
Task 6. Construction:																
Task 6a. Marshplain and Marsh Creek channel grading (under same contract as Task 5):																
Phase 1 marsh grading (on-site cut and fill)							■									
Phase 2 marsh grading (grade to marshplain elevations)										■						
Phase 3 marsh grading (cut channels and create berms)										■						
Task 6b. Water control structures and revegetation mananagement:																
Install water control structures											■					
Plant maintenance events											■	■	■	■	■	■
Task 6c. Marsh revegetation – tule pre-establishment (tasks 6 c, d & e will be done under one contract)																
Bid advertisement for revegetation, select contractor								■								
Install water control structures (Task 6b) and begin managing water levels											■					
Regular management/assessment visits											■	■	■	■	■	■
Task 6d. Riparian and native grassland revegetation																
Planting plan							■									
Bid advertisement for revegetation										■						

Project Milestones and Deliverables	Year 1 - 2012				Year 2 - 2013				Year 3 - 2014				Year 4 - 2015			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Select contractor										▮						
Site preparation (weed control, soil prep, install irrigation)										▮						
Purchase and plant container plants											▮					
Task 6e. Habitat levees																
Planting plan								▮								
Construction of habitat levees (Task 6a, Phase 2 marsh grading)											▮					
Purchase and plant container plants (Task 6d)											▮					
Task 6f. Two levee breaches *(this will not occur until 2017)*																

* *N*ote: Generic schedule; Actual schedules expected to vary.

Attachment D
Budget Detail

CA State Coastal Conservancy staff labor details for Task 1

Staff person	Hourly rate	Total hours	Total labor	fringe 36%	Fed approved indirect 60.71%	Total
Jeff Melby	$32.40	1700	$55,080.00	$19,828.80	$45,477.13	$120,385.93

a. PERSONNEL

Position	Number	Salary	No. of Hours	Total Amount
CPDA II	1	$32.40/hour	1700	$55,080.00

b. FRINGE BENEFITS

Base (personnel)	$55,080.00
Rate	36%
Total Fringe Benefits	**$19,828.80**

c. TRAVEL
No travel is proposed as part of this application.

d. EQUIPMENT
No equipment purchases are proposed as part of this application.

e. SUPPLIES
No supplies are proposed as part of this application.

f. CONTRACTUAL

Task	**Procurement Method**	**Total**
Wetland Restoration Construction	Competitive Bid Process pursuant to State and Federal requirements.	$980,000
Monitoring	Competitive Bid Process pursuant to State and Federal requirements.	$300,000
Total		**$1,280,000**

g. CONTRUCTION
N/A

h. OTHER
No other expenses are proposed as part of this application.

i. TOTAL DIRECT CHARGES	$ 1,354,908
j. INDIRECT COSTS	$ 45,092
k. TOTAL PROPOSED COSTS	**$ 4,154,200**
FEDERAL FUNDS REQUESTED	$ 1,400,000.00
RECIPIENT SHARE (MATCH)	$ 2,754,200.00
RECIPIENT SHARE OF TOTAL PROPOSED COSTS	66%
FEDERAL SHARE OF TOTAL PROPOSED COSTS	34%

Attachment E
DRAFT Dutch Slough Surface-water Quality Monitoring Workplan

Dutch Slough Surface-water Quality Monitoring Draft Workplan

HydroFocus Inc., May 31, 2011

Introduction and Background

The Dutch Slough Restoration Project will create approximately 640 acres of tidal marsh and riparian floodplain habitat, 90 acres of sub-tidal open water habitat, 100 acres of managed non-tidal marsh for black rail habitat enhancement and subsidence reversal, and 240 acres of enhanced irrigated pasture on three parcels; Emerson, Gilbert and Burroughs. Marsh Creek will be re-routed to restore the creek delta on the Emerson parcel, providing seasonal freshwater flows to cue out-migrating salmon into the restored marsh. A new Marsh Creek distributary channel will be constructed through the Emerson marsh, with low riparian berms or "natural levees" along the channel banks.

The levee of north Emerson will be breached to create sub-tidal open water. North Emerson is expected to be used as a borrow area, to supply needed fill for levee and intertidal marsh construction. The site will be graded to the habitat elevations for low marsh, mid marsh, and high marsh. On Gilbert and Burroughs, fill will be placed to raise lower-elevation areas to low marsh and mid marsh elevations. The northern part of Gilbert will be managed to enhance black rail habitat and provide subsidence reversal benefits in the creation of permanently flooded wetlands. Management of irrigated pasture and seasonal wetlands on north Burroughs will be optimized for Swainson's hawk's foraging and will remain in cattle grazing or forage crops. The southern parts of Gilbert and Burroughs will be restored to tidal marsh, riparian floodplain and sub-tidal open water habitat.

The project will be constructed and implemented over several years. Because of the large size of the site and timing of project funding (and possibly project approvals), the three parcels will be on different schedules.

Water Quality Concerns and EIR Monitoring Requirements

Project surface water quality concerns are related primarily to potential effects on Dutch Slough and influence of Marsh Creek. From a drinking water perspective, dissolved organic carbon (DOC) and associated disinfection byproducts (DBPs) represent a concern for Contra Costa Water District at the Rock Slough intakes. Methyl mercury (MeHg) is a potential threat to delta fisheries; the Central Valley Regional Water Quality Control Board proposed water quality objective of 0.06 nanograms MeHg /L is to prevent excessive mercury accumulation in fish. The Regional Board objective is based on the correlation between levels in fish and methyl mercury concentrations in water.

Dissolved Organic Carbon

Available information indicates that DOC production will likely be greatest on mid elevation marshes and during extreme low tides characterized by alternate wetting and drying and lowest on perennially inundated emergent marsh and in open water areas. Alternate wetting and drying of highly organic sediments results in oxidation and generation of labile organic carbon. Data collected by both USGS and the Moss Landing Marine Laboratory indicate that fluxes of DOC from tidal marshes vary substantially across the tidal cycle and that exports from marshes are greatest during extreme low tide events when tidal sloughs, banks, and associated pore water drain from the marsh. Fleck and others[2] demonstrated decreasing DOC concentrations in a non-tidal permanently flooded wetland on oxidized peat soils. Historically, Delta DOC concentrations have been highest during winter. For example at Rock Slough during 2009 and 2010, DOC concentrations ranged from 1.9 mg/L during summer to 6.4 mg/L during winter. During winter, precipitation flushes DOC from organic soils resulting large drain-water DOC concentrations and loads from Delta islands[3].

Entrainment of increased DOC concentrations in drinking water diversions is likely if DOC is transported from the restoration site to the drinking water intake at Rock Slough when water is being diverted. Due to Dutch Slough's westerly Delta location in the Delta, DOC produced at Dutch Slough will most often be transported westward into Suisun Marsh and San Francisco Bay and therefore is generally unlikely to increase DOC at drinking water intakes. The potential for

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[2] Fleck, Jacob A., Miranda S. Fram, and Roger Fujii, 2007, Organic Carbon and Disinfection Byproduct Precursor Loads from a Constructed, Non-Tidal Wetland in California's Sacramento-San Joaquin Delta. San Francisco Estuary and Watershed Science. Vol. 5, Issue 2 [May 2007], Article 1. http://repositories.cdlib.org/jmie/sfews/vol5/iss2/art1

[3] Deverel, Steven J., David A. Leighton and Mark R.Finlay. Processes Affecting Agricultural Drainwater Quality and Organic Carbon Loads in California's Sacramento-San Joaquin Delta. San Francisco Estuary and Watershed Science. Vol. 5, Issue 2 [May 2007]. Article 2. http://repositories.cdlib.org/jmie/sfews/vol5iss2/art2

eastward flow and dispersion is greatest when net-flow is lowest (summer and fall) when CCWD diversions have historically been the highest[4]. Evaluation of the timing of net DOC production at Dutch Slough is directly relevant to questions regarding the impact on DOC concentrations at the Delta drinking water diversion. Since the nature of the DOC influences formation of DBPs[5], some monitoring attention should be given to potential transport of DBP precursors[6].

We researched the literature for DOC concentrations and loads for tidal and permanently flooded wetlands (Table 1). Table 1 shows that surface-water DOC concentrations are generally less than 10 mg/L. Few load estimates were available which ranged from 7 to 140 g/m^2-year. Agricultural DOC concentrations ranged from less than 10 to over 90 mg/L and agricultural loads the Delta ranged from 1 to 150 g/m^2-year[7]. Based on the literature, DOC loads from Dutch Slough tidal marsh are likely to be similar to Delta agricultural DOC loads. However, Fleck et al.[8] showed higher DBP levels per unit DOC for marsh surface water are greater than for agricultural drainage waters.

[4] Data provided by CCWD shows maximum Delta diversions during May – August of over 15,000 acre feet per month. During the remaining months, diversions are generally less than 10,000 acre feet per month.
[5] Fleck et al (2007) showed higher proportions of DBP formation potential per unit of DOC in the Twitchell Island demonstration wetland.
[6] Contra Costa Water District uses chloramines for disinfection. Key potential byproducts include trihalomthanes, and haloacetic acids,
[7] Deverel, Steven J., David A. Leighton and Mark R.Finlay. Processes Affecting Agricultural Drainwater Quality and Organic Carbon Loads in California's Sacramento-San Joaquin Delta. San Francisco Estuary and Watershed Science. Vol. 5, Issue 2 [May 2007]. Article 2. http://repositories.cdlib.org/jmie/sfews/vol5iss2/art2
[8] Fleck, Jacob A., Miranda S. Fram, and Roger Fujii, 2007, Organic Carbon and Disinfection Byproduct Precursor Loads from a Constructed, Non-Tidal Wetland in California's Sacramento-San Joaquin Delta. San Francisco Estuary and Watershed Science. Vol. 5, Issue 2 [May 2007], Article 1. http://repositories.cdlib.org/jmie/sfews/vol5/iss2/art1

Table 1. DOC concentrations and loads for marshes.

Location	Reference citation	DOC (mg/L)	DOC loads (g DOC/m2-year)
Great Sippewissett Marsh, Massachusetts	Howes and Goehringer[1]	1 to 5	-
Two marshes adjacent to Rhode River, Massachusetts	Jordan et al.[2]	5.2 to 7.0	21 to 43
Liberty Island, Sacramento, California	Lehman et al.[3]	2 to 5	-
Salt marshes along the south-eastern and eastern US coasts	Nixon[4]		8.4 to 140
Canary Creek salt marsh, Lewes, Delaware	Roman and Daiber[5]	2 to 8.1 with an average of 3.2 for flood tidal cycle and 4.6 for ebb tidal cycle	-
Riverine mangrove wetland and the Shark River, Everglades National Park, Florida	Romigh et al.[6]	1.7 to 17.9	-
Sacramento-San Joaquin Delta, California, Browns Island and Mandeville Tip	Stepanauskas et al.[7]	3.78 to 4.39	-
Marshes (in general)	Thurman[8]	10 to 20	
Rhode River estuary and Kirkpatrick marsh, Chesapeake Bay, Massachusetts	Tzortziou et al.[9]	11.15	-
Twitchell Island subsidence reversal wetland on oxidized agricultural soils[10]	Fleck et al.[11]	3 to 200	7 to 37
Three marshes, offshore Georgia	Wheeler[12]	0.8 to 4.5 (largest filter size)	-

[1] Howes, BL and Goehringer, DD, 1994, Porewater drainage and dissolved organic carbon and nutrient losses through the intertidal creek banks of a New England salt marsh. *Marine Ecology Progress Series* 114: 289-301.
[2] Jordan, TE, Correll, DL, Whigham, DF, 1983, Nutrient Flux in the Rhode River: Tidal Exchange of Nutrients by Brackish Marshes. *Estuarine, Coastal and Shelf Science* 17: 651-667.
[3] Lehman, PW, Mayr, S, Mecum, L, 2010, The freshwater tidal wetland Liberty Island, CA was both a source and sink of inorganic and organic material to the San Francisco Estuary. *Aquatic Ecology* 44(2): 359-372.
[4] Nixon, SW, 1980, Between Coastal Marshes and Coastal Waters – A Review of Twenty Years of Speculation and Research on the Role of Salt Marshes in Estuarine Productivity and Water Chemistry *in* Hamilton, P and Macdonald, KB (Eds). Estuarine and Wetlands Processes with Emphasis on Modeling. Plenum Press: New York, pgs. 437-526.
[5] Roman, CT and Daiber, FC, 1989, Organic carbon flux through a Delaware Bay salt marsh: tidal exchange, particle size distribution, and storms. *Marine Ecology Progress Series* 54: 149-156.
[6] Romigh, MM, Davis, SE, Rivera-Monroy, VH, Twilley, RR, 2006, Flux of organic carbon in a riverine mangrove wetland in the Florida Coastal Everglades. *Hydrobiologia* 569: 505-516.
[7] Stepanauskas, R, Moran, MA, Bergamaschi, BA, Hollibaugh, JT, 2005, Sources, bioavailability, and photoreactivity of dissolved organic carbon in the Sacramento-San Joaquin River Delta. *Biogeochemistry* 74: 131-149.

[8] Thurman, EM, 1985, Organic Geochemistry of Natural Waters. Martinus Nijhoff/Dr W. Junk Publishers, The Netherlands.
[9] Tzortziou, M, Osburn, CL, Neale, PJ, 2007, Photobleaching of Dissolved Organic Material from a Tidal Marsh-Estuarine System of the Chesapeake Bay. *Photochemistry and Photobiology* 83: 782-792.
[10] Fleck et al (2007) projected decreasing DOC concentrations with time as DOC is flushed from the formerly agricultural organic soils.
[11] Fleck, JA, Fram, MS, Fujii, R, 2007, Organic Carbon and Disinfection Byproduct Precursor Loads from a Constructed, Non-Tidal Wetland in California's Sacramento-San Joaquin Delta. *San Francisco Estuary and Watershed Science* 5(2): Article 1. http://repositories.cdlib.org/jmie/sfews/vol5/iss2/art1
[12] Wheeler, JR, 1976, Fractionation by molecular weight of organic substances in Georgia coastal water. *Llimnology and Oceanography* 21(6): 846-852.

Mercury

Concern over Delta mercury Hg pollution has resulted in posting of fish advisories recommending limited human consumption.[9] The Hg species of greatest concern to human health in the Delta is monomethylmercury (MeHg) in fish.[10] In aquatic systems, MeHg production is typically microbially mediated[11] and is readily bioaccumulated by phytoplankton and zooplankton and biomagnified up the food web, ultimately posing a threat to fish consumers.[12] The source of MeHg is the microbial transformation of elemental Hg present in Delta soils and sediments and input from the atmosphere. Wetlands can be regions of high MeHg production potential. However, there is little information about MeHg contributions from Delta tidal wetlands.

In 2008, the Central Valley Regional Water Quality Control Board (CVRWQCB) drafted a proposed amendment to the Water Quality Control Plan for the Sacramento and San Joaquin River Basins for control of MeHg and total Hg in the Delta.[13] The amendment proposes numeric objectives for MeHg in fish tissue.[14] To achieve the proposed fish tissue objectives, the CVRWQCB proposes an implementation plan with actions and time schedules to reduce methyl and total Hg sources to the Delta. Available information indicates that achieving an annual average MeHg (unfiltered) concentration of 0.06 nanograms per liter (ng/L) in ambient Delta waters should enable attainment of the proposed fish tissue objectives.

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[9] OEHHA (Office of Environmental Health Hazard Assessment), 1994, California Environmental Protection Agency, Sacramento, CA.

[10] Fitzgerald, W.F., Engstrom, D.R., Mason, R.P., and E.A. Nater, 1998. The case for atmospheric mercury contamination in remote areas. *Environ. Sci. Technol.* 32: 1-7.

[11] Compeau, G.C. and R. Bartha, 1985, Sulfate-reducing bacteria: Principal methylators of mercury in anoxic estuarine sediment. *Appl. Envirn. Microbiol.* 50: 498-502.; Berman, M. and R. Bartha, 1986, Levels of chemical versus biological methylation of mercury in sediments. *Bull. Environ. Contam. Tox.* 36: 401-404.; Gilmour, C. C., Henry, E.A., and R. Mitchel, 1992, Sulfate stimulation of mercury methylation in freshwater sediments. *Environ. Sci. Technol.* 26(11): 2281-2287.

[12] Hall, BD, Bodaly, RA, Fudge, RJP, Rudd, JWM, and DM Rosenberg, 1997, Food as the dominant pathway of methylmercury uptake by fish. *Water Air Soil Pollut.* 100: 13-24.

[13] Wood, M, Morris, P, Cooke, J, Louie, S and D Bosworth, 2008, Amendments to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Methylmercury and Total Mercury in the Sacramento-San Joaquin Delta Estuary. Central Valley Regional Water Quality Control Board, Draft Staff Report for Public Review. Sacramento. February. Available at: http://www.waterboards.ca.gov/centralvalley/water_issues/tmdl/central_valley_projects/delta_hg/staff_report_feb08/bpa_full_rpt.pdf

[14] The recommended alternative would establish Delta-specific methyl mercury fish tissue objectives of 0.08 and 0.24 milligrams per kilogram (mg/kg), wet weight, in fish tissue for large trophic level 3 and 4 fish (150-500 millimeters [mm] total length) and 0.03 mg/kg, wet weight, for small trophic level 2 and 3 fish (less than 50 mm). The proposed objectives are protective of threatened and endangered wildlife species that consume large and small Delta fish.

Based on current Hg levels in fish and the correlation of aqueous MeHg concentrations with fish tissue concentrations, the CVRWQCB has proposed reductions needed to meet proposed MeHg goals. In the Marsh Creek area, a 73 percent reduction is proposed. For achieving reductions, the CVRWQCB plans to proceed with an implementation program, but allowing studies to be completed before dischargers must take actions to achieve their allocations. A key relevant issue is the requirement for new MeHg sources that include wetland restoration projects to evaluate their potential effects and implement on-site projects to minimize any increase in total mercury loading. The primary goal of monitoring programs would be to estimate the sum of annual MeHg loads produced by the multitude of agriculture and wetland areas in each subarea for comparison to the subarea allocations.

Methylation of inorganic Hg to produce methyl mercury occurs primarily near the wetland water-sediment interface, where there is an abundance of organic matter and ideal oxidation-reduction conditions.[15] Research results[16,17] indicate that methylation of inorganic Hg to produce MeHg occurs primarily near the wetland water-sediment interface where there is an abundance of organic matter and ideal oxidation-reduction conditions. Therefore, the MeHg flux from the restored marsh will likely be highest on small-scale, mid elevation marshes that drain frequently and lowest on large-scale, low marshes that seldom drain completely.

The US Geological Survey and others measured and modeled MeHg concentrations and fluxes in slough waters on Browns Island in the western Delta[18]. Reported measured concentrations ranged from about 0.04 to 0.13 ng/L. Modeled concentrations of MeHg in the dissolved fraction also varied over several timescales and the highest concentrations of the dissolved fraction occurred at the lowest tides when the greatest proportion of island water was in the channels. Their results also indicated that higher concentrations of reactive dissolved organic carbon as represented by higher values for specific UVA absorbance at 250 nm resulted in greater proportions of MeHg in the dissolved phase. The primary factors controlling methylation of dissolved mercury are concentrations of dissolved organic matter and chloride which influence the release of Hg from sediments.

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[15] Heyes, A, Moore, TR, Rudd, JWM, and JJ Dugoua, 2000, *Can. J. Fish Aquat. Sci.* 57: 2211–2222; Mason, R, Bloom, N, Cappellino, S, Gill, G, Benoit, J, and C Dobbs, 1998, Investigation of porewater sampling methods for mercury and methyl mercury. *Environ. Sci. Technol.* 32: 4031-4040.

[16] Marvin-DiPasquale, M.C., Agee, J.L., Bouse, R.M., and B.E. Jaffe, 2003, Microbial cycling of mercury in contaminated pelagic and wetland sediments of San Pablo Bay. *California Environmental Geology* 43:260–267.

[17] Gilmour, C.C., Henry, E.A., and R. Mitchel, 1992, Sulfate stimulation of mercury methylation in freshwater sediments. *Environ. Sci. Technol.* 26(11): 2281-2287.

[18] Jacob Fleck, George Aiken, Brian Bergamaschi, and Doug Latch, 2007, Mercury Release from Delta Wetlands: Facilitation and Fluxes, Draft Final Report, Task 5.3a Methyl mercury loading studies in Delta Wetland, CalFed Project 2000-G01

The dissolved MeHg flux for Brown's Island is largely driven by pressure events such as barometric and hydraulic conditions. In the spring, the fluxes of dissolved MeHg were greatest during the neap but this was also the period of relatively high barometric pressure. During autumn the quiescent flow and weather conditions led to a slow and steady off island flux of dissolved MeHg. In the winter the dominant factor was river stage. Browns Island varied from being a net source to net sink of for MeHg during different time scales.

Impounded marshes for subsidence reversal and carbon sequestration can be large exporters of MeHg relative to current discharges from farmed delta islands.[19] However, subsurface agricultural drainage loads from peat soils will likely increase over time with ongoing subsidence. Continuing subsidence will increase drain flows due to increased hydraulic gradients across levees. This will likely result in increased subsurface MeHg drainage loads. Moreover, recent data from the Twitchell Island Rice Project demonstrates that using drainage control and recirculation can greatly reduce MeHg export loads from impounded marshes.

Slotton and Ayers[20] determined mercury levels in fish at 5 locations in the Dutch Slough and Marsh Creek area in 2008; three sites located within the planned restoration zone. At two sites (Marsh Creek at Big Break and Little Dutch Slough) fish mercury concentrations were lower than at the control site at Big Break. Data for Emerson Slough site showed concentrations similar to concentrations measured in fish from Big Break. Fish collected at the Marsh Creek site at Delta Road above the tidal prism had the lowest concentrations, though this may have been a temporary condition linked to recent low-flow drought conditions.

Fish mercury concentrations for the March 2008 sample collection event were intermediate in relation to comparative data from other sites in the Delta. Data from the August 2008 event (except at the upper Marsh Creek site which was low), were relatively low relative to comparable data from other Delta locations. Slotton and Ayers concluded that current conditions within the proposed Dutch Slough restoration area do not apparently contribute to elevated MeHg exposure to the aquatic food web in relation to conditions at adjacent Big Break. Their results provide baseline measures of MeHg exposure.

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[19] Heim, W.A., Deverel, S., and M. Stephenson, 2009, Farmed Islands and Monomethylmercury in the Sacramento-San Joaquin Delta Draft Final Report submitted to the Central Valley Regional Water Quality Control Board. Heim and others sampled agricultural drains from eight Delta islands and found that MeHg loads were correlated with depth of subsidence.

[20] Slotton, Darell, G. and Shaun M. Ayers, 2009, Lower Marsh Creek and Dutch Slough Region 2008 Biosetinel Mercury Monitoring,

Hypoxia

In addition to MeHg and DOC, there are concerns for deep water areas for development of anoxic conditions. Increases in phytoplankton blooms enhance organic matter sedimentation, which accelerates microbial oxygen consumption and results in bottom-water hypoxia. The San Joaquin River has shown signs of increased phytoplankton blooms, which are attributed to increases in nutrient loading, especially nitrate and phosphorus and changes in river flow. Increased phytoplankton growth in response to nutrient loading leads hypoxic to anoxic conditions. Once phytoplankton begin consuming dissolved oxygen, the bottom of the channel becomes reduced, causing iron oxide sediments to release phosphorus, which adds to the anoxic system. Reduced mixing causes vertical salinity and temperature gradients, which extend the residence times of the bottom waters and increase the anoxic conditions. The extent to which hypoxic conditions develop at Dutch Slough will depend on nutrient inputs, phytoplankton growth and mixing.

Marsh Creek

Marsh Creek water quality concerns include methyl mercury and other constituents associated with urban and agricultural activities. The EIR states that exceedance of acceptable criteria for endocrine disrupter chemicals shall prevent relocation of Marsh Creek. Endocrine disrupter chemicals include an array of organic chemicals such as pesticides, pharmaceuticals and personal care products and plasticizers.

Stellar Environmental Solutions reported water quality data[21] for 5 locations in Marsh Creek for sampling conducted during 2007. MeHg was consistently above the proposed Regional Board objective of 0.06 ng/L. However, concentrations decreased substantially at the most downstream sampling location which is downstream of the Brentwood Wastewater Treatment Facility discharge. At this location, MeHg concentrations ranged from 0.068 to 0.126 ng/L.[22]. These values are within the range of previously reported concentrations of 0.05 – 0.25 nanograms/liter (ng/L) reported for the San Joaquin River. Fecal and total coliform and E. Coli values were also generally high for all samples. Concentrations of priority trace elements (arsenic, lead, zinc, chromium, cadmium, copper, nickel, selenium) were not measured at levels of concern.

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[21] Stellar Environmental Solutions, 2007, MARSH CREEK SEDIMENT AND WATER QUALITY BASELINE MONITORING Y2006-Y2007 MARSH CREEK, CALIFORNIA. Water samples were analyzed for ammonia (as nitrogen), chloride, DOC and total organic carbon (TOC), bromide, total mercury, dissolved mercury, and methyl mercury, nitrate and total Kjeldahl nitrogen (TKN), total dissolved solids (TDS), total coliform, fecal coliform, and e. coli, priority 13 metals (zinc, arsenic, copper, cadmium, chromium, lead, nickel, selenium), iron, aluminum, manganese, total phosphorus and orthophosphate.

[22] Measured concentrations were 0.080 ng/L 0.089 ng/L 0.087 ng/L 0.126 ng/L 0.068 ng for samples collected on 11/1/06, 1/5/07, 2/14/07, 5/4/07, 8/8/07.

Recently, Friends of Marsh Creek Watershed initiated regular water quality monitoring nitrate, pH, conductivity, dissolved oxygen and temperature. Volunteers also report numbers of live and dead fish. Fish kills occurred in 2005, 2007 and 2008. Yet despite these problems, Marsh Creek supports substantial biological diversity including fall-run Chinook salmon, river otters, muskrats, green herons, western pond turtles, and other fish and wildlife[23].

Current Site Activities

Current site activities most likely contribute water-quality constituents of concern to Dutch Slough, Emerson Slough and Little Dutch Slough. Specifically, DOC, MeHg and nutrients in drain water are likely discharged primarily through subsurface drainage ditches to pump stations where drainage water is discharged to adjacent channels. One drainage pump station on each of the three parcels regularly removes drainage water.

Monitoring requirements listed in the EIR

The EIR states that "should the monitoring program study find that Marsh Creek mercury levels are outside the acceptable range, diverting Marsh Creek onto the Emerson Parcel may be prohibited." *Preliminary analysis of available data for Marsh Creek indicates methyl mercury levels are not outside the acceptable range. Also,* "If and when the RWQCB establishes criteria for EDCs of concern, the Marsh Creek water-quality testing program described in Mitigation 3.2.1-4 shall be expanded to include these compounds. Marsh Creek shall not be relocated if EDC levels exceed acceptable criteria." The ER requires that monitoring shall be used to estimate the potential TOC and DOC export from the site in relation to possible effects on DOC and TOC at the CCWD intakes at Rock Slough.

Summary and Key Questions to be Addressed by Monitoring

Based on the available information summarized above, key relevant points for the monitoring approach follow.

- DOC and MeHg concentrations and export loads will likely be greatest on mid elevation marshes and during extreme low tides. Tidal wetlands can be a net sink or source of DOC and MeHg and the measurement timescale influences which condition is applicable.
- The range of reported DOC loads for tidal marshes is generally similar to Delta agricultural loads.

[23] Friends of Marsh Creek Watershed, The State of the Marsh Creek Watershed 2010 Summary Report

- Concentrations of MeHg in Marsh Creek samples collected nearest the Dutch Slough project are within the range of values reported for the San Joaquin River.
- Fish MeHg concentrations in 2008 in the Dutch Slough Project area and Marsh Creek were generally low relative to other Delta locations.

Key questions about water-quality impacts of the Dutch Slough project follow.

- How will DOC and MeHg concentrations and loads on the three parcels change with project implementation?
- How will fish MeHg levels be affected by the project?
- What are the concentrations and loads of other constituents of concern in Marsh Creek (e.g. pesticides, pharmaceuticals, etc.) and how might they impact Dutch Slough water quality and biota?
- Will water quality deteriorate in the deep water area on the Emerson Parcel and result in anoxia?

Proposed Monitoring and Reporting

The proposed general approach will:

1. Assess baseline conditions under agricultural conditions;
2. Determine project concentrations and loads and compare with baseline conditions;
3. Collect water quality data for Marsh Creek;
4. Conduct MeHg biosentinal monitoring and
5. Asses water quality conditions in the sub-tidal open water area on Emerson Tract.

Task descriptions follow.

Task 1 Baseline Monitoring

Primary tasks during the one year of baseline monitoring include the following.

- Measure concentrations of MeHg, TOC and DOC in drainage ditches on Emerson, Gilbert and Burroughs parcels and estimate loads using power derived flow estimates. Grab samples in drainage ditches will be collected monthly.
- Monitor Marsh Creek water quality for MeHg, DOC, TOC, pesticides, pharmaceuticals and personal care products, trace elements and field parameters (pH, conductivity, dissolved oxygen, turbidity). Monitoring will include unfiltered

and filtered samples and discharge weighted sampling based on flow measurements.[24] Field parameter data will include pH, conductivity, dissolved oxygen and turbidity.

Task 2 Project Monitoring

The following subtasks are proposed.

1. Measure MeHg, DOC and TOC concentrations and flow at selected locations within selected mid-marsh areas to estimate project loads for DOC, TOC and MeHg. Field parameter data will include pH, conductivity, dissolved oxygen and turbidity. To address the DOC and TOC concerns for CCWD intakes, it is proposed that current DOC and TOC loads from the three parcels be compared with loads at mid-marsh areas on the Emerson Parcel.
2. Measure MeHg, DOC, TOC and nutrient concentrations and flow from subsidence reversal wetlands and estimate loads. Field parameter data will include pH, conductivity, dissolved oxygen and turbidity.
3. Monitor water quality in the sub-tidal open water area on Emerson. Constituents and parameters include nutrients (nitrogen and phosphorus species), pH, dissolved oxygen, conductivity, temperature chlorophyll.
4. Biosentinel monitoring for MeHg.

Task details follow.

Task 1.0 – Baseline Monitoring

Subtask 1.2 Baseline Concentrations and Loads of MeHg, TOC and DOC for Dutch Slough parcels

Drain Water samples will be collected monthly for the purpose of determining MeHg, DOC and TOC concentrations and loads from the individual parcels. For methyl mercury, grab samples will be collected using ultra clean sampling techniques[25]. On each parcel, drain water will be collected from the main drainage ditches that flow to drainage pumps. For mercury, samples will be collected in a double bagged 250 mL pre-cleaned borosilicate bottle and the bottle and cap were triple rinsed with ambient water just prior to collecting a sample. Samples will be immediately placed on ice and kept in the dark for shipping to the laboratory. Samples will be preserved within 48 hours of collection with 0.5 percent

[24] Discharge is currently measured at the USGS gaging station about 3 miles upstream of Emerson.
[25] Gill GA, Fitzgerald WF. Mercury sampling of open ocean waters at the picomolar level. Deep-Sea Res. 1985; 32: 287-297

hydrochloric acid. Grab samples for TOC and DOC will be collected in amber glass bottles and placed on ice. Samples for DOC will be filtered through 0.45 micron nitrate cellulose filters within 24 hours. All grab samples will be collected at a depth of about 4 inches below the surface.

Monthly drain outflow estimates will be calculated by using power consumption records and pump-efficiency test data. We will obtain monthly power consumption records from Pacific Gas and Electric, reported in kilowatt-hours. We propose to subcontract with Power Services Inc. to conduct pump-efficiency tests for all discharging pumps which will provide a value for acre feet pumped per kilowatt-hour. By multiplying the power consumed by the pump test value, we will obtain a monthly outflow estimate in acre-feet. Previous investigations[26], demonstrated good comparability of flow values obtained using power consumption estimates with metered flow. Loads will then be calculated by multiplying the monthly outflow pump estimates by the measured MeHg, TOC and DOC concentrations. Field parameters (pH, electrical conductivity, dissolved oxygen and turbidity) will be measured during each visit using a YSI multimeter at a depth of about 8 inches. The meter will be calibrated in the field with standards with values close to the sampled water. Samples will also be collected for nitrogen and phosphorus (nitrate, ammonia, organic nitrogen and phosphate).

Subtask 1.2 Marsh Creek water quality.

At the USGS gaging station on Marsh Creek, water quality samples will be collected monthly and during selected precipitation events such as the first flushing rain. During each sampling event for 1 year, samples will be collected and analyzed for constituents listed in Table 2. We recommend flow weighted sampling. Specifically, water samples will be collected using an isokinetic D-77 bottle sampler[27]. To accurately represent the average conditions in the channel, equal discharge-increment sampling is desired. By collecting depth-integrated samples at discharge centroids, the EDI method approximates the channel-average conditions. Knowledge of the flow distribution in the channel allows for the collection of these samples so sampling should be coordinated with USGS flow measurements. Five equally spaced centroids should satisfactory. The sampler is lowered to just above the bed and raised to the surface at an appropriate transit rate such that an equal water volume is collected in the bottle at each centroid location. This provides a vertically integrated sample at five points across the section.

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[26] Heim, W.A., Deverel, S., Ingrum, T., Piekarski, W., and Stephenson, M., 2009, Assessment of Methylmercury Contributions from Sacramento-San Joaquin Delta Farmed Islands. Report submitted to Chris Foe and the Central Valley Regional Water Quality Control Board. Also, Templin WE, Cherry DE. Drainage-Return, Surface-Water Withdrawal, and Land-Use Data for the Sacramento-San Joaquin Delta, with Emphasis on Twitchell Island, California. U.S. Geological Survey Open-File Report 97-350, 1997.

[27] EDWARDS, T. K. AND G. D. GLYSSON. 1999. Field methods for measurement of fluvial sediment, p. 1–89. In Techniques of Water-Resources Investigations, Book 3. U.S. Geological Survey, Reston, Virginia.

Table 2. Proposed constituents and field parameters for determination in Marsh Creek samples.

Constituent and field parameter	Justification
Methyl mercury	Key constituent of concern for western Delta and Marsh Creek area
Total mercury	Source for methyl mercury production
Dissolved organic carbon	Generally related to methyl mercury production.
Pesticides; organo-phosphates, organo-chlorines, carbamates and pyrethroids	Substantial quantities of pesticides applied in the Marsh Creek watershed as per the Department of Pesticide Regulation. Possible aquatic toxicity effects.
Herbicides List of specific constituents to be developed based on products applied in watershed.	Substantial quantities of herbicides applied in the Marsh Creek watershed as per the Department of Pesticide Regulation. Possible aquatic toxicity effects.
Nitrogen species (nitrate, ammonia, organic nitrogen)	Fertilizer sources in Marsh Creek water shed
Phosphorus (ortho-phosphate and total phosphorus)	Fertilizer sources in Marsh Creek water shed
Pharmaceuticals, personal care products, plasticizers	Regulatory concerns about endocrine function disruption.
Filed parameters (pH, turbidity, conductivity, dissolved oxygen)	General water chemistry and identification of water sources
Major ions (calcium, magnesium, sodium, bicarbonate, chloride, sulfate)	General water chemistry and identification of water sources
Total dissolved solids	General water chemistry and identification of water sources
Water isotopes (oxygen-18 and deuterium)	General water chemistry and identification of water sources
Coliform bacteria (total, fecal and E. coli)	Marsh Creek is known to have high levels.

Task 2.0 – Project Monitoring

Subtask 2.1 Measure MeHg and DOC concentrations and flow at selected locations within selected mid-marsh areas.

Mid-tidal marsh areas are the likely predominant sources of MeHg and DOC from the project. We recommend flow measurement and sampling during selected tidal cycles and periods especially when export loads are likely the highest such as during lowest tides. To measure flow, we recommend using the index velocity method[28] using an upward looking acoustic Doppler velocity meter for continuous velocity, stage and channel area determination and an acoustic Doppler current profiler for periodic discharge measurements for calibration. We recommend measurement and sample collection at 1 or 2 sites.

Depth integrated water samples for DOC and MeHg will be collected using isokinetic D-77 bottle sampler or auto sampler every few hours during several tidal cycles. DOC and ultra violet absorption at 254 nanometers (UVA-254)[i] will be measured as there is usually correlation of MeHg with concentrations of these constituents and field parameters such as oxidation-reduction potential. Disinfection byproduct formation potential will be determined on selected samples. Concentrations and discharge estimates will be used to estimate loads for key periods during the year. Continuously collected field parameter data will include pH, conductivity, dissolved oxygen, oxidation-reduction potential, and turbidity. The USGS on Brown's Island successfully used continuous in-situ dissolved organic matter (DOM) measurements using commercially available instrumentation. MeHg and DOC concentrations and loads can thus be estimated for longer periods. In light of the adaptive management and transferability value, we recommend use of in-situ DOM measurements.

Subtask 2.2 Measure MeHg, DOC, TOC and nutrient concentrations and flow from subsidence reversal wetlands and estimate loads. Permanently flooded wetland for subsidence reversal can be sources of MeHg and DOC. We recommend measuring concentrations of these and additional key constituents and flow at the surface and

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[28] SIMPSON, M. R. AND R. BLAND. Methods for accurate estimation of net discharge in a tidal channel. Institute of Electrical and Electronics Engineers Journal of Oceanic Engineering 25:437–445. This methodology was used by NEIL K. GANJU*, DAVID H. SCHOELLHAMER, and BRIAN A. BERGAMASCHI, 2006, Suspended Sediment Fluxes in a Tidal Wetland: Measurement, Controlling Factors, and Error Analysis Estuaries Vol. 28, No. 6, p. 812–822.

subsurface drain-water outlets to estimate per area loads. The wetland should be constructed to facilitate control of wetland outflows for measurement, flow restriction and if possible, drain-water recirculation. Flow measurements and estimates and sampling similar to that described Gamble and others, Deverel and others, and Heim and others[29] using a combination of weirs, flow meters and transducers to record stage is recommended. Field parameter data will include pH, conductivity, dissolved oxygen and turbidity.

Subtask 2.3 Monitor water quality in the Emerson sub-tidal open water area. Vertical profiles, grab samples and continuous monitoring will be used to evaluate the water quality of the Emerson sub-tidal open water area. The measured constituents and parameters will include dissolved oxygen, temperature, pH, turbidity, 5-day biochemical oxygen demand, and chlorophyll a. Temperature, DO, pH and turbidity will be measured at mid-depth every 15 minutes at one continuous monitoring station. Vertical profiles will be used to measure temperature, DO, pH, and electrical conductivity every foot. Sampling for vertical profiles will take place at all sites before 10:00 a.m. to ensure that, as much as possible, the minimum daily DO concentrations are observed. Vertical profiles generally will be conducted weekly initially. Monthly samples will be collected for determination of nutrient concentrations (nitrogen and phosphorus species). Frequency can change depending on results.

Subtask 2.4 Biosentinel monitoring for MeHg.

We recommend implementing project biosentinel monitoring similar to the baseline analysis conducted by Slotten and Ayers[30] for the Dutch Slough area conducted in two seasonal periods: March and August of 2008. During each of these periods small fish biosentinels were collected from five sites:

- Marsh Creek above tidal influence at Delta Road, upstream of Oakley
- Marsh Creek within tidal influence, near the confluence with Big Break and within the planned restoration area
- Emerson Slough (mid-slough within the planned restoration area)

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[29] Heim, W.A., Deverel, S., Ingrum, T., Piekarski, W., and Stephenson, M., 2009, Assessment of Methyl mercury Contributions from Sacramento-San Joaquin Delta Farmed Islands. Report submitted to Chris Foe and the Central Valley Regional Water Quality Control Board.
Deverel, Steven J., David A. Leighton and Mark R.Finlay. Processes Affecting Agricultural Drainwater Quality and Organic Carbon Loads in California's Sacramento-San Joaquin Delta. San Francisco Estuary and Watershed Science. Vol. 5, Issue 2 [May 2007]. Article 2.
http://repositories.cdlib.org/jmie/sfews/vol5iss2/art2
Gamble, J.M., Burow, K.R., Wheeler, G.A., Hilditch, R., Drexler, J.Z., 2003, Hydrogeologic data from shallow flooding demonstration project, Twitchell Island, California, 1997-2001. U.S. Geological Survey Open-File Report 03-378, 42 p

[30] Slotton, Darell, G. and Shaun M. Ayers, 2009, Lower Marsh Creek and Dutch Slough Region 2008 Biosetinel Mercury Monitoring,

• Little Dutch Slough (mid-slough within the planned restoration area)
• Big Break, adjacent to Dutch Slough restoration region
The five sites were sampled similarly in each of the two seasonal collections, for a total of 10 individual site-sampling events. Approximately 36 individual fish were collected, prepared, and individually analyzed from each site-sampling, with 358 total samples analyzed for the overall project. We recommend also sampling at key locations within the project such as mid marsh channels and open water areas.

Fish were collected by boat electroshocking, backpack electroshocking, and seining. Samples of the species and size ranges targeted for analytical work were separated by species, cleaned, and frozen directly in the field in sealed Ziploc bags with water surrounding, using dry ice. Samples were analyzed for total mercury, which has been established as an acceptable and advised measure of MeHg in fish, as virtually all of the mercury in fish is in the form of MeHg, so the two analyses deliver equivalent results, while the total Hg analysis is typically more precise. The fish samples were analyzed as dry powders for consistency. Moisture percentage was carefully determined, through sequential weighings, to allow conversion to fresh/wet weight concentrations. Samples were analyzed for total mercury with standard cold vapor atomic absorption (CVAA) spectrophotometry,

Quality Assurance and Control

A final quality assurance project plan (QAPP) will present functions, procedures, and specific quality assurance (QA) and quality control (QC) activities designed to achieve the data quality objectives (DQOs) for the site investigation activities to be conducted prior to and after project implementation. Key elements of the QAPP are included here.

Data Quality Objectives and Quality Assurance Assessment

Data quality objectives (DQOs) describe the quality of data needed from a data collection activity to support decisions. We propose DQOs to ensure that the data collected meets the project goal of 1) establishing credible and defensible baseline water quality conditions and 2) assessing any project water-quality impacts. Field and laboratory analytical results collected during one year will be used to establish the baseline water-quality conditions prior to project implementation. The DQOs are designed to obtain sufficient data of defensible quality to meet the project objectives.

Data quality indicators (DQIs) include precision, accuracy, representativeness, comparability, completeness and sensitivity. Data will be considered valid if DQO's for each indicator are achieved. The effectiveness of the QA/QC

program will be assessed by the quality of the data generated by the analytical laboratory and determination of field parameters. Table 3 summarizes the types and frequency of collection of field QC samples and laboratory QC samples for this investigation.

Table 3. Types and frequency of quality control samples.

Analysis	QC Type	Frequency
Field QC		
	Field Duplicates	1/10 samples
	Equipment Blanks	1/day
Laboratory QC		
	Method blanks	1/20 samples
	MS/MSD	1/20 samples
	LCS or blank spikes	1/20 samples

Precision and Accuracy

Precision is a measurement of the agreement of a set of replicate results. Accuracy is defined as the nearness of a result or the mean of set of results to the true, known, or reference value. We will evaluate precision and accuracy by assessing the results of the analyses quality control (QC) samples. We propose to assess precision and accuracy through the use of laboratory and field duplicates (split), laboratory matrix spike (MS) and matrix spike duplicate (MSD) and control samples and control-sample duplicates (LCS and LCSD).

Matrix spikes (MS), matrix spike duplicates (MSD), laboratory control samples (LCS) and laboratory control sample duplicates (LCSD) will be analyzed by the laboratory to evaluate the accuracy and precision of the sample extraction and analysis procedures and to evaluate potential matrix interference. Matrix interference, the effect of the sample matrix on the analysis, may partially or completely mask the response of analytical instrumentation to the target constituents. Matrix interference may have a varying impact on the accuracy and precision of the extraction and/or analysis procedures, and may bias the sample results high or low. The MS or MSD samples are prepared by adding a known quantity of the target compound(s) to an environmental sample. The samples are then extracted and/or analyzed as a typical environmental sample and the results are reported as percent recovery.

The spike percent recovery is the primary measure of accuracy and is defined as:

$$\text{Recovery (\%)} = \frac{\text{spike analysis result - original sample concentration}}{\text{concentration of spike addition}} \text{ x100\%}$$

We will review the MS and MSD recoveries for compliance with laboratory-established control limits to evaluate the accuracy of the extraction and analysis procedures. Laboratory control samples (LCS) are prepared like MS samples except a clean control matrix is used instead of an environmental sample. Typical control matrices include Reagent Grade Type II water. LCS and LCSD samples are used to evaluate laboratory accuracy independent of matrix effects. The DQO for percent recovery should be within the standard range from 80 to 115 %. For some constituents, the range is narrower and this will be described the QA/QC report.

The laboratory performs duplicate analyses of MS and LCS samples are to evaluate the precision of analytical procedures. Precision is evaluated by calculating a relative percent difference (RPD) using the following equation:

$$\text{RPD (\%)} = \left| \frac{\text{(Spike Concentration} - \text{Spike Duplicate Concentration)}}{\frac{1}{2}\text{(Spike Concentration} + \text{Spike Duplicate Concentration)}} \right| \text{ x 100\%}$$

To evaluate analytical precision, we will compare the RPD to laboratory-established control limits for the MS/MSD and LCS/LCSD duplicate pairs. Depending on the constituent, the DQO for acceptable maximum RPD values will range from 10 to 20 %. The QA/QC review will identify RPD values outside laboratory control limits. Precision will also be assessed using field duplicates. Field duplicate samples are processed identically to regular samples and submitted to the laboratory with dummy site identification labels. The acceptable limit for RPD values for field duplicates in 35 %.

In addition to the above, for major ion, salinity and dissolved solids data will be used when applicable to assess the accuracy of the data using the following calculations and criteria.

Anion-Cation Charge Balance. Charge imbalance indicates problems or omissions in the analyses of major ions and cations. It is calculated as the difference between the sums of anions and cations in milliequivalents per liter (meq/L) as a percentage:

$$\text{Charge Imbalance (\%)} = \frac{Anions - Cations}{Anions + Cations} \times 100$$

We use a maximum percent difference of 5 % as a DQO's and guideline for an acceptable charge balance.

Ratio of Calculated Sum of Dissolved Solids to Specific Conductance. The sum of dissolved solids (in mg/L) divided by the specific conductance should fall within the DQO which ranges from 0.55 to 0.81. Values substantially outside this range suggest an error in the analysis. We multiply the bicarbonate concentration by 0.4918 to estimate carbonate on ignition. We add the concentrations (in mg/L) of the major ions plus iron.

Ratio of the Sum of Reacting Constituents to Specific Conductance. The ratio of the sum of reacting cations or anions to 0.01 x specific conductance should be within the DQO range 0.92 to 1.24.

Ratio of the Residue on Evaporation (ROE) to Specific Conductance. The ratio of the ROE to the specific conductance should be within the DQO range of 0.55 to 0.86. Samples with a high organic content may have ratios higher than 1.0 in some cases.

Ratio of the Residue on Evaporation (ROE) to the Calculated Sum of Dissolved Solids. The ratio of the ROE to the calculated sum of dissolved solids should be within the DQO range 0.90 to 1.12. Ideally, the ratio should be equal to 1. We divide the ROE at 180 ^{o}C (in mg/L) by the sum of the concentrations (in mg/L) of the major anions and cations plus iron.

Representativeness

Representativeness is the degree to which the data effectively represent the characteristics of a population, variations in a parameter at a sampling point or an environmental condition. The representativeness of the data is insured through the consistent application of established field and laboratory procedures. We will ensure representativeness by using proper sampling procedures and collection of field blank samples. Field blank samples will be evaluated to assess the potential

for contamination. Blank contamination indicates the potential for false positive results at low concentrations and the potential for a high bias in detected results. False-negative results will be reduced through proper sample handling, preservation, use of proper sample containers, and analyses within prescribed holding times.

The frequency of field blank samples for this investigation is listed in Table 3. Samples stored in coolers on ice will be delivered daily to the laboratory. The laboratory will prepare method blanks for each parameter analyzed. The method blank is used to evaluate whether or not contaminants are present in the laboratory and the possibility of false-positive results. We will report and analyze the effect of anomalies reported by the laboratory either on receipt of the samples at the laboratory or during analytical processes. Anomalies include adherence to recommended holding times of samples before analysis; calibration of laboratory instruments; adherence to analytical methods; quantitation limits used for samples; and completeness of data documentation.

Completeness

The completeness of the data consists of an estimate of the amount of data expected from the field program versus the amount of data actually entered into the database that is available for interpretation. We will assess completeness as:

Percent Complete (% C) =v/t x 100
where:
v = number of valid measurements
t = total number of measurements

The DQO for completeness for this project is 90 %.

Comparability

Comparability expresses the confidence with which one data set can be compared to another data set. Comparability of data for this investigation will be achieved by consistently following standard field sampling, laboratory analyses, QA/QC, data reporting, reviewing, and validating procedures in adherence with the requirements of this QAPP. The use of U.S. EPA-approved analytical methods, specified and well-documented analyses, approved laboratories and the standardized process of data review and validation ensure a high degree of analytical comparability.

Sensitivity

Sensitivity is the ability to assess the measurement result against established criteria. The required sensitivity is a function of assessment criteria, sample size, and analytical detection limits. Detection limits will be at or below applicable regulatory goals, the primary assessment criteria. The sample sizes are such that the collected volume is greater than the sample volume required for each analytical method to obtain an acceptable quantitation limit for the investigation.

Reporting

Quarterly reports will provide the following information.

Baseline Monitoring

- Sample locations
- Sampling and measurement methods, instrument calibration results
- Results: concentrations, flow measurements and estimates, load calculations, stage data
- QA/QC results
- Laboratory reports and chain of custody forms
- Field sheets

Project Monitoring

- Sample locations
- Sampling and measurement methods, instrument calibration methods and results
- Results: concentrations, flow measurements and estimates, load calculations, stage and flow data, biosentinel monitoring results, load comparison with baseline results in mass per unit area and unit time.
- QA/QC results
- Laboratory reports and chain of custody forms
- Field sheets

Attachment F

Summary of Key Tasks and Associated Budgets, Outputs and Outcomes

TASK	IMPLEMENTING PARTIES	Timeframe (calendar years)	USEPA FUNDING	MATCH	OUTPUTS/Deliverables	OUTCOMES
1. Management, administration, and reporting	SCC	2012-2015	$120,000	In kind $180,000	Ê Quarterly progress reports, draft/final project report.	Ê Successful grant administration
2. Infrastructure relocation	Management Team, construction contractors	2014-2015	None	$456,000	Ê Pipeline replacement design Ê Bid documents Ê Before and after photos	Ê Pipeline relocated out of tidal area
3. Design and engineering	Management Team, design contractor	2012-2017	None	$547,000	Ê 80% design drawings Ê Excavation plan for ISD borrow site Ê Design Marsh Cr crossing Ê Design all new levees Ê Grading plan for Emerson parcel Ê 100% design drawings for Emerson parcel	Ê Well-designed project Ê Optimal ecological outcomes Ê Cost effective project administration and design
4. Water quality monitoring	Management Team, sub-contractor to design contractor	2012-2017	$300,000	$330,000	Ê Quarterly reports Ê Annual reports	Ê Accurate assessment of baseline conditions and project effects on water quality
5. Site preparation	RD 2137, construction contractor	2013	None	$910,000	Ê Bid documents Ê Before and after photos	Ê Removal of weeds and structures prior to site grading

6a. Construction: marshplain and Marsh Creek channel grading	**Management Team, construction contractor**	**2013-2014**	**$608,600**	**$4,517,000**	**Ê Before and after photos**	**Ê On-site cut and fill Ê Grade to marsh elevations Ê Cut channels and create berms Ê Create topographic features necessary for tidal marsh establishment**
6b. Construction: water control structures and revegetation management	**Management Team, construction contractor**	**2014-2017**	**None**	**$150,000**	**Ê Annual reports on plant maintenance and revegetation success**	**Ê Install water control structures Ê Conduct regular plant maintenance**
6c. Construction: marsh revegetation	**Management Team, construction contractor**	**2014-2017**	**$101,400**	**none**	**Ê Quarterly reports Ê Annual reports**	**Ê Install water control structures Ê Conduct regular water management Ê Up to 570 acres of tule marsh restored**
6d. Construction: riparian and native grassland revegetation	**Management Team, construction contractor**	**2014-2017**	**$270,000**	**$542,000**	**Ê Planting plan Ê Bid documents Ê Quarterly reports Ê Annual reports**	**Ê 35 acres of riparian woodland restored**
6e. Construction: habitat levees	**Management Team, construction contractor**	**2014**	**None**	**$31,500**	**Ê Habitat levee design Ê Planting plan**	**Ê Several miles of levee planted with native plants Ê Creation of shaded riverine aquatic, riparian woodland, and native grassland**

6f. Construction: levee breaches	**Management Team, construction contractor**	**2017**	**None**	**$580,000**	**Design of bridges** **Bid documents** **Before and after photos**	**Introduction of tidal action to project site** **Bridges over breaches to maintain perimeter trail**